Germ Plasm Evaluation Program

Progress Report No. 2

U.S. Meat Animal Research Center

In cooperation with
Kansas State University
and the University of Nebraska

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U.S. MEAT ANIMAL RESEARCH CENTER

GERM PLASM EVALUATION PROGRAM[1]

PROGRESS REPORT NO. 2

The cattle Germ Plasm Evaluation Program at the U.S. Meat Animal Research Center is designed to characterize different biological types, as represented by different breeds, for the full spectrum of economic traits relating to growth, feed efficiency, reproduction, maternal ability and carcass and meat traits. The basic objective of this program is to develop an understanding relating to optimizing such biological factors as cow size, milk level, etc., in different feed environments and production situations.

The program was started with the 1969 breeding season. The first cycle (Cycle I, Phase 2)* involved breeding Hereford and Angus cows (Phase 1) by artificial insemination (AI) to Hereford, Angus, Jersey, South Devon, Limousin, Simmental and Charolais bulls (table 1, appendix). The three calf crops (1970, 1971 and 1972) by these sire breeds were born in March, April and early May. Reports on birth and weaning traits of all calves and on postweaning growth, feed efficiency and carcass and meat traits of the steers (ARS-NC-13, March, 1974) are available by request. All female progeny were retained for evaluation of reproduction and maternal traits.

The second cycle (Cycle II) started with the 1972 breeding season and includes two calf crops (1973 and 1974). Brown Swiss and Red Poll female populations were added to the Hereford and Angus cow herds used in Cycle I. The Hereford and Angus females were bred by AI to Hereford, Angus, Brown Swiss, Red Poll, Maine Anjou, Gelbvieh and Chianina bulls; the Red Poll and Brown Swiss females were bred by AI to Hereford, Angus, Red Poll and Brown Swiss bulls (table 2, appendix). Performance data being collected is similar to that obtained for the first cycle.

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[1] U.S. Meat Animal Research Center, Agricultural Research Service, U.S. Department of Agriculture, Clay Center, Nebraska 68933; Standardization Branch, Agricultural Marketing Service, U.S. Department of Agriculture; Kansas State University, Manhattan; and the University of Nebraska, Lincoln; cooperating.

* Within each cycle of sire breeds, foundation cows (Hereford and Angus in Cycle I; Hereford, Angus, Brown Swiss and Red Poll in Cycle II) are referred to as Phase 1. Their calves are called Phase 2 and the calves from Phase 2 cows are called Phase 3. This terminology differs from earlier reports in that calves were previously considered as being in the same phase as their dams until they calved for the first time.

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This report provides summarized data from the Cycle I, Phase 2 cows for puberty and conception as yearlings plus calving, rebreeding and weaning information as 2-year-olds (cows born in 1970-71-72), 3-year-olds (cows born in 1970-71) and 4-year-olds (cows born in 1970). Birth and preweaning data are presented for the calves (Cycle I, Phase 3) out of Cycle I, Phase 2, 2-year-old cows and sired by Hereford, Angus, Brahman, Devon and Holstein bulls (table 3, appendix). Data are included on calving difficulty and preweaning growth for the 1973-74, Cycle II, Phase 2 calf crops. Information is included on the 1973, Cycle II, Phase 2 calf crop for postweaning growth, puberty and conception as yearlings of the heifers and postweaning growth, feed efficiency and carcass and meat traits of the steers.

CYCLE I, PHASE 2

Cows. The foundation Hereford and Angus cows used in the program were purchased as calves at weaning from commercial producers in Nebraska. The cows were 2-, 3-, 4- and 5-year-olds at calving in 1970; 2-, 3-, 4-, 5- and 6-year-olds at calving in 1971; and 3-, 4-, 5-, 6- and 7-year-olds at calving in 1972.

Sires. There were 32 Hereford, 35 Angus, 33 Jersey, 28 South Devon, 20 Limousin, 28 Simmental and 26 Charolais bulls used during the 1969, 1970 and 1971 breeding seasons. The Hereford and Angus bulls used in this program were sampled from bulls which had been selected on individual performance information as a basis for gaining entry into the progeny testing program of artificial insemination organizations. These same Hereford and Angus sires are used as controls in all cycles and phases of the Germ Plasm Evaluation Program so that comparisons among sire breeds can be made across all cycles and phases by comparing deviations from the Angus-Hereford and Hereford-Angus crossbred controls. The Jersey bulls were selected at random from two commercial AI organizations and the South Devon bulls were sampled from an importation made in 1969 by a commercial organization. Simmental, Limousin and Charolais bulls were sampled from bulls available from commercial organizations and from the Canada Department of Agriculture for the Simmental and Limousin.

General releases of information on individual sires are not planned because erroneous conclusions may be drawn from the ranking of individual sires with the relatively small number of progeny per sire in this program. The objective of the program is to characterize breeds as representatives of different biological types. To do this effectively, a large sample of sires of each breed is necessary. Thus, the number of progeny per sire is generally low. A relatively large number of progeny per sire are required for a high level of accuracy in ranking individual sires on their breeding value for most economic traits.

For a cooperative study with the Canada Department of Agriculture, Hereford x Angus, Jersey x Angus, Simmental x Angus and Charolais x Angus heifers were randomly selected at weaning time and shipped, 4 to 8 weeks

after weaning, to the Research Station, Lethbridge, Alberta. There were 12 heifers per breed group in 1970 and 10 heifers per breed group in 1971 and 1972. These females and their offspring are being individually fed to evaluate efficiency of production.

Matings. Cycle I, Phase 2 yearling heifers were mated to Hereford, Angus, Brahman, Devon and Holstein bulls during a 45- to 46-day AI season and to Hereford and Angus bulls for a 21- to 24-day cleanup period in 1971, 1972 and 1973. As 2-year-old cows, they were mated to Hereford, Angus, Chianina, Gelbvieh and Maine Anjou bulls for a 42- to 45-day AI season and to Hereford and Angus bulls during a 22-day cleanup period in 1972, 1973 and 1974. As 3- and 4-year-olds, the cows are being mated by natural service to Brown Swiss bulls for a 64-day period.

Data Analysis. Calving difficulty, calf mortality, calf birth weight and preweaning growth were analyzed by least-squares procedures for unequal subclass numbers separately for each age group using a model that included the effects of breed of cow's sire, breed of cow's dam, breed of calf's sire, year, sex and most two-way interactions, with birth date as a covariate. Birth and 200-day weight and preweaning growth rate were adjusted to a steer basis by adjustment factors calculated from the data and shown in the footnotes of each table. Unweighted means are presented for calf birth date, calf crop percentage, postpartum interval, AI percentage and pregnancy rate.

Calving Difficulty. Calving difficulty scores were assigned to each calf at birth on the basis of the following scoring system:

Score		Description
1	No difficulty	- Calves unassisted; however, straightening of the head and/or front legs may be necessary.
2	Little difficulty	- Assistance given by hand, but no jack or puller used; assistance actually may not have been required.
3	Moderate difficulty	- Assistance given with jack or calf-puller; some difficulty was encountered even with the pullers being used.
4	Major difficulty	- Calf jack used and major difficulty encountered; usually 30 minutes or more required to deliver calf.
5	Caesarean birth	- Performed after determination made that calf could not be delivered with a calf-puller.
6	Posterior presentation	- Assistance given.

Summaries of calving difficulty in 635 births from 2-year-old cows, 427 births from 3-year-old cows and 241 births from 4-year-old cows are provided in tables 2, 4 and 6, respectively. For these summaries, scores of 1 and 2 were combined and are designated no difficulty and scores of 3 and 4 were combined and are designated calf-puller.

Reproductive and Maternal Performance. Information on the rebreeding performance of 2-, 3- and 4-year-old cows is provided in tables 3, 5 and 7. Least-squares means for cow weight at fall palpation time and fall, 1974 hip height measurements are also included in these tables. Preweaning growth and calf crop percentage are provided in tables 2, 4 and 6 for these same cows.

CYCLE I, PHASE 3

Sires. There were 16 Hereford, 25 Angus, 14 Brahman, 12 Devon and 13 Holstein sires bred to Cycle I, Phase 2 yearlings during the 1971, 1972 and 1973 breeding seasons. These sires were sampled from commercial organizations, with some of the Hereford and Angus sires being the same as used in Cycle I, Phase 2.

Calving Difficulty. Calving difficulty (table 8) of 559 calves were analyzed by least-squares procedures for unequal subclass numbers that included the effects of breed of cow's sire, breed of cow's dam, breed of calf's sire, years, sex and most two-way interactions, with birth date as a covariate. The same system of scoring calving difficulty was used in Phase 3 as in Phase 2 of Cycle I.

Preweaning Growth. Preweaning growth data (table 9) for 483 calves were analyzed with the same analytical model as calving difficulty. The data were adjusted to a steer basis with adjustment factors calculated from the data. These adjustment factors are given in the footnote of table 9.

CYCLE II, PHASE 2

Cows. The foundation Hereford and Angus cows used in Cycle I were continued in Cycle II, Phase 2 of the program. The cows calving in 1973 were 4 to 8 years of age and in 1974 were 4 to 9 years of age. As previously indicated, mature Brown Swiss and Red Poll cows were added to these herds for the 1972 and 1973 breeding season.

Sires. There were 15 Hereford, 16 Angus, 16 Red Poll, 11 Brown Swiss, 11 Gelbvieh, 18 Maine Anjou and 20 Chianina bulls used during the 1972 and 1973 breeding seasons. The Hereford and Angus sires had also been used in Cycle I of the program and the other bulls were sampled from commercial organizations. The Brown Swiss sires included four domestic bulls and seven bulls imported from Switzerland and Germany.

Calving Difficulty. For convenience of comparison, the data are presented separately for the seven sire breeds with Hereford and Angus dams (table 10) and for the Hereford, Angus, Red Poll and Brown Swiss sires with the same four dam breeds (table 12). Calving difficulty data were available on 1891 calvings. The same system for scoring calving difficulty was used in this cycle as was used in Cycle I. Calving difficulty and calf mortality were analyzed by least-squares procedures for unequal subclass numbers using a model that included the effects of breed of sire, breed of dam, dam age, year, sex and most two-way interactions, with birth date as a covariate.

Preweaning Growth. These data were grouped for breed group comparisons in the same manner as the calving difficulty data. Preweaning growth data (tables 11 and 13) were available on 1772 calves. These data were analyzed by least-squares procedures using the same model as for calving difficulty. The data were adjusted to a steer basis with the adjustment calculated from the data. These adjustment factors are given in the footnotes of tables 11 and 13. Calves were creep fed whole oats from mid-August until weaning. Creep feed consumption was 46 lb./calf in 1973 and 139 lb./calf in 1974. The calves were weaned in late October in 1973 and in mid-September in 1974. The early weaning in 1974 was necessary because of drought conditions.

Postweaning Growth and Feed Efficiency. Postweaning growth and feed efficiency data were obtained on 380 steers from the 1973 calf crop. Rations are presented in table 14. Summaries of average daily gain and adjusted final weights are presented in table 15 for steers out of Hereford and Angus dams and in table 23 for steers by Hereford, Angus, Red Poll and Brown Swiss sires. Feed efficiency information is presented in table 16. The steers were serially slaughtered as described in the carcass and meats section.

At weaning, steer calves with adjusted weaning weights more than three standard deviations below the mean for their breeding group were removed from the program. The remaining steers were placed in the feedlot by breed of sire groups (replicated, two lots per breed of sire) to obtain data on growth rate and feed efficiency. Steers from Red Poll and Brown Swiss cows were penned with steers of their reciprocal cross.

The postweaning average daily gains are based on actual weaning weights (no weaning shrink) and final weights at slaughter. Final weights at slaughter were obtained as the average of two weights (on feed and water) taken on different days to reduce errors due to differences in fill. Adjusted final weights were obtained by adding the sum of postweaning average daily gain x days on feed, to weaning weight adjusted to 200 days of age. Average daily gains and adjusted final weights for the different slaughter groups are only for the steers slaughtered in that group. Feed efficiency for each breed group was obtained by dividing the cumulative average daily TDN consumption per steer by the average daily gain of the steers remaining on feed up to each of the slaughter dates. The measurement of feed efficiency began after about a 30-day conditioning

period. Metabolizable energy (Mcal.) was obtained by multiplying pounds TDN by 1.64.

Postweaning growth was analyzed by least-squares procedures for unequal subclass numbers using a model that included the effects of slaughter group, breed of dam, age of dam, breed of sire within slaughter group, breed of dam by breed of sire within slaughter group and breed of dam by slaughter group. The feed efficiency data are unweighted averages of pen means.

Carcass and Meat. Steers out of Red Poll and Brown Swiss cows and those by Hereford, Angus and Red Poll sires were serially slaughtered after 220, 248 and 282 days postweaning. Steers sired by Chianina, Gelbvieh and Maine Anjou bulls were serially slaughtered after 248, 282 and 338 days postweaning. Steers by Brown Swiss bulls and out of Hereford and Angus cows were slaughtered at all four dates. Stratified sampling by weight was used to select steers for slaughter within each breed-of-sire by breed-of-dam group. Slaughter groups had approximately the same average birth date.

Steers were transported to a commercial slaughter plant approximately 12 hours prior to slaughter. Carcass data were obtained after a 24-hour chill. Carcasses were evaluated for conformation, maturity, marbling, color, texture and firmness and USDA Quality Grade by representatives of the U.S. Meat Animal Research Center; Standardization Branch, Agricultural Marketing Service, USDA; and Kansas State University. Loin eye area and external fat thickness were measured and USDA Yield Grade determined. These results are presented in tables 17 to 19 for steers out of Hereford and Angus cows and in tables 24 and 25 for steers out of Hereford, Angus, Red Poll and Brown Swiss sires. In addition, selected linear carcass measurements and measures of other traits were obtained, but are not included in this report.

After obtaining cooler carcass data, the right side of each carcass of steers out of Hereford and Angus cows was transported from the commercial slaughter plant to Kansas State University for detailed cut-out and meat quality evaluation. The right side was separated into wholesale cuts, and the wholesale cuts were processed into closely trimmed, boneless cuts, except dorsal and transverse spinous processes were left in short loin cuts and dorsal spinous processes and rib bones were left in rib cuts. No more than 0.30 inch of fat was left on any surface. The amounts of retail product, fat trim and bone were determined for each wholesale cut. These results are presented on a percentage of carcass weight basis in table 20.

One steak was removed at the 11th rib from each carcass for Warner-Bratzler shear determination. The steaks were cooked at 350°F to an internal temperature of 150°F. After cooling for approximately 30 minutes at room temperature, one-half inch cores were removed for shear determination. Steaks were removed at the 10th rib from four representative carcasses per breed group per slaughter date, cooked at 350°F to an

internal temperature of 150°F, and subjected to taste panel evaluation for tenderness, flavor, juiciness and overall acceptability by trained taste panelists. These results are presented in tables 21 and 22.

The data for the carcass and meat traits were analyzed by least-squares procedures for unequal subclass numbers using the same model as used for postweaning growth.

Postweaning Growth, Puberty and Conception. Postweaning growth, age at puberty and conception of yearling heifers born in 1973 are presented in table 26 for those out of Hereford and Angus cows and in table 27 for those by Hereford, Angus, Red Poll and Brown Swiss bulls. The heifers were developed in the feedlot from weaning in October until mid-April. The postweaning ration was 50% corn silage and 50% alfalfa haylage fed ad libitum. Heifers were grazed on improved cool season pastures until the end of a 42-day AI period which began May 20. The heifers were moved to improved warm season pastures prior to a 22-day cleanup period.

Date of puberty, defined as date of the first observed standing estrus, was determined by checking animals for estrus twice daily. Weights were taken every 28 days from weaning to the breeding period and again at the termination of the breeding period. Heifers were inseminated only after they were observed in standing estrus. Estrus was determined from weaning to an average of approximately 16 months of age (end of breeding season).

Postweaning growth, puberty and conception traits were analyzed by least-squares procedures for unequal subclass numbers using a model that included the effects of breed of sire, breed of dam, breed of sire by breed of dam and age of dam.

TABLE 1. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
POSTWEANING GROWTH, PUBERTY AND CONCEPTION OF HEIFERS
CYCLE I, PHASE 2 - HEIFERS BORN IN 1970-71-72

Breed of Heifer						Adjusted[d]		
Sire	Dam	No. Heifers	Adj. 550-Day Wt., lb.[a]	Hip Ht. at 21 Mo. of Age, in.[b]	Reaching Puberty, %[c]	Puberty Age, days	Puberty Wt., lb.	Percent Pregnant[e]
Angus	Hereford	68	712	45.9	100.0	374	585	96.2
Hereford	Angus	64	730	46.0	99.0	367	588	89.8
	Average	132	721	46.0	99.5	371	587	93.0
Jersey	Hereford	61	664	47.0	100.0	334	501	93.8
	Angus	56	656	46.0	100.0	309	464	79.0
	Average	117	660	46.5	100.0	322	483	86.4
South Devon	Hereford	63	743	48.0	99.3	385	623	87.7
	Angus	57	738	47.5	96.5	343	582	82.4
	Average	120	740	47.8	97.9	364	603	85.1
Limousin	Hereford	83	712	48.3	83.8	419	660	72.5
	Angus	78	728	47.8	99.8	376	625	91.6
	Average	161	720	48.1	91.8	398	643	82.0
Simmental	Hereford	90	780	48.8	92.6	384	648	81.7
	Angus	67	771	48.0	100.0	359	613	90.8
	Average	157	776	48.4	96.3	372	631	86.2
Charolais	Hereford	77	773	48.3	96.2	405	666	78.0
	Angus	55	785	47.6	96.6	390	668	83.2
	Average	132	779	48.0	96.4	398	667	80.6
Average	Hereford	442	731	47.7	95.3	384	614	85.0
All Sire	Angus	377	735	47.2	98.7	357	590	86.1
Breeds	Average	819	733	47.5	97.0	371	602	85.6

[a] Adjusted 550-day wt. = 200-day wt. + (350-day postweaning ADG x 350 days), adjusted for year and birth date.
[b] Hip height measurements at 21 months of age available only on 1972-born heifers.
[c] Estrus was determined from weaning to an average of approximately 15 months of age (end of AI) for the 1970 calf crop and to an average of approximately 16 months of age (end of AI plus cleanup) for the 1971-72 calf crops. Cows that calved but not observed in estrus are included in this group.
[d] Adjusted to comparable values if puberty had been detected in 100% of the heifers in all breed groups.
[e] The breeding period was 45 to 46 days by AI and 21 to 24 days by natural service.

TABLE 2. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DIFFICULTY, CALF CROP PERCENTAGE, CALF MORTALITY, BIRTH WEIGHT AND WEANING WEIGHT OF CALVES FROM 2-YEAR-OLD COWS[a]
CYCLE I, PHASE 2 - COWS BORN IN 1970-71-72

Breed of Cow		No. Calves Born	Type of Parturition, %				Calf Crop, %[c]		Calf Mortality, %[d]		Calf Wt., lb.[e]	
Sire	Dam		No Diff.[b]	Calf-Puller	C-Section	Abn. Presentation	Born	Weaned	Early	Late	Birth	200-Day
Angus	Hereford	48	57.6	34.4	3.9	4.1	88.1	78.0	4.7	6.8	68.9	383
Hereford	Angus	50	62.4	27.3	8.5	1.8	87.7	76.2	7.9	5.2	67.8	357
	Average	98	60.0	30.9	6.1	3.0	87.9	77.1	6.3	6.0	68.4	370
Jersey	Hereford	51	86.3	11.8	.0	2.7	86.9	84.2	3.1	.0	66.9	412
	Angus	46	73.1	19.8	.0	7.4	83.9	74.3	10.1	1.3	63.8	405
	Average	97	79.7	15.8	.0	5.0	85.4	79.3	6.6	.6	65.3	409
South Devon	Hereford	50	47.7	43.7	5.1	3.5	83.9	78.7	.3	6.0	75.9	374
	Angus	46	50.0	43.3	3.5	3.1	82.5	71.5	10.7	2.6	76.7	392
	Average	96	48.9	43.5	4.3	3.3	83.2	75.0	5.5	4.3	76.3	383
Limousin	Hereford	53	66.7	19.6	.6	13.0	72.0	53.0	10.5	15.9	69.2	377
	Angus	65	63.3	30.4	1.7	4.6	90.9	79.3	9.1	3.8	71.3	385
	Average	118	65.0	25.0	1.2	8.8	81.5	66.1	9.8	9.8	70.3	381
Simmental	Hereford	69	54.4	37.3	7.5	.8	82.2	79.5	1.0	2.3	76.2	414
	Angus	55	53.4	31.2	9.3	6.0	83.8	75.1	7.0	3.4	75.7	412
	Average	124	53.9	34.3	8.4	3.4	83.0	77.3	4.0	2.9	75.9	413
Charolais	Hereford	60	57.9	29.8	6.9	5.4	81.8	72.3	4.2	7.4	75.5	395
	Angus	42	54.3	36.8	2.6	6.3	78.2	65.5	10.8	5.4	76.3	393
	Average	102	56.1	33.3	4.7	5.9	80.0	68.9	7.5	6.4	75.9	394
Average	Hereford	331	61.8	29.4	3.9	4.9	82.5	74.0	4.0	6.4	72.1	393
All Sire	Angus	304	59.4	31.5	4.2	4.9	84.5	73.6	9.3	3.6	71.9	391
Breeds	Average	635	60.6	30.5	4.0	4.9	83.5	73.8	6.6	5.0	72.0	392

[a] Calves from these cows were sired by Hereford, Angus, Devon, Holstein and Brahman bulls (appendix table 3).
[b] No assistance or minor hand assistance.
[c] Of cows alive at calving; heifers removed from experiment only for serious injury or by death and not for being open.
[d] Early mortality is within 24 hr of birth; late is from 24 hr after birth until weaning.
[e] Adjusted for birth date and to a steer basis. Least-squares adjustment factors for heifers were 4.8 lb. for birth weight and 20 lb. for 200-day weight.

TABLE 3. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DATE, REBREEDING PERFORMANCE AND SIZE OF COWS CALVING AS 2-YEAR-OLDS
CYCLE I, PHASE 2 - COWS BORN 1970-71-72

Breed of Cow		No. Calving as 2-Year-Olds	Avg. Calving Date	Bred AI, %[a]	Postpartum Interval, Days[b]	Percent Pregnant[a]	Cow Wt. at 2½ Yrs. of Age, lb.	Hip Ht. at 2½ Yrs. of Age, in.[c]
Sire	Dam							
Angus	Hereford	48	March 24	83.9	83.6	89.3	872	47.0
Hereford	Angus	50	March 24	85.7	84.8	85.7	901	46.4
	Average	98	March 24	84.8	84.2	87.5	887	46.7
Jersey	Hereford	51	March 22	90.2	77.4	98.0	802	47.1
	Angus	46	March 22	91.5	78.2	89.4	791	47.2
	Average	97	March 22	90.8	77.8	93.7	796	47.1
South Devon	Hereford	50	March 27	78.8	83.2	80.8	926	49.2
	Angus	46	March 25	87.2	82.8	89.4	940	48.7
	Average	96	March 26	83.0	83.0	85.1	933	48.9
Limousin	Hereford	53	April 2	70.7	82.1	84.5	927	49.4
	Angus	65	March 27	78.3	82.6	75.4	922	48.9
	Average	118	March 30	74.5	82.4	79.9	925	49.1
Simmental	Hereford	69	March 24	75.7	88.8	81.0	958	49.8
	Angus	55	March 22	84.2	91.0	78.9	951	49.4
	Average	124	March 23	79.9	89.9	80.0	954	49.6
Charolais	Hereford	60	March 27	80.3	86.3	85.2	1000	49.7
	Angus	42	March 22	76.7	91.1	81.4	1029	49.1
	Average	102	March 25	78.5	88.7	83.3	1015	49.4
Average	Hereford	331	March 26	79.9	83.7	86.5	914	48.7
All Sire	Angus	304	March 24	83.9	85.3	83.4	922	48.3
Breeds	Average	635	March 25	81.9	84.5	84.9	918	48.5

[a] The breeding period was 42 to 45 days by AI and 22 days by natural service. Percent pregnant = no. palpated as pregnant ÷ no. palpated.
[b] Interval from calving to first estrus.
[c] Hip height measurements at 2½ years of age available only on 1972-born cows.

TABLE 4. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DIFFICULTY, CALF CROP PERCENTAGE, CALF MORTALITY, BIRTH WEIGHT AND WEANING WEIGHT OF CALVES FROM 3-YEAR-OLD COWS[a]
CYCLE I, PHASE 2 - COWS BORN 1970-71

Breed of Cow		No. Calves Born	Type of Parturition, %				Calf Crop, %[c]		Calf Mortality, %[d]		Calf Wt., lb.[e]	
Sire	Dam		No Diff.[b]	Calf-Puller	C-Section	Abn. Presentation	Born	Weaned	Early	Late	Birth	200-Day
Angus	Hereford	27	65.8	14.2	4.1	15.9	88.9	80.3	4.1	5.6	82.9	424
Hereford	Angus	35	68.0	25.9	2.1	4.0	87.0	79.0	4.4	4.8	84.2	424
	Average	62	66.9	20.0	3.1	10.0	88.0	79.6	4.2	5.2	83.5	424
Jersey	Hereford	49	88.3	8.6	.0	3.1	94.2	86.9	3.3	3.8	77.0	439
	Angus	30	72.7	20.0	.7	6.7	90.9	90.9	.0	.0	77.0	438
	Average	79	80.5	14.3	.3	4.9	92.3	89.0	1.6	1.9	77.0	438
South Devon	Hereford	27	70.7	18.5	.0	11.6	78.8	71.3	5.9	3.7	85.2	433
	Angus	32	78.4	9.2	3.0	9.3	84.2	80.0	5.6	.0	84.8	425
	Average	59	74.6	13.8	1.5	10.5	81.5	75.6	5.7	1.8	85.0	429
Limousin	Hereford	37	81.8	13.3	4.1	.8	88.1	72.9	3.4	13.9	84.8	435
	Angus	39	84.3	16.1	.2	.0	78.0	68.6	3.8	9.1	84.6	424
	Average	76	83.1	14.7	2.1	.4	83.1	70.7	3.6	11.5	84.7	430
Simmental	Hereford	45	76.0	15.6	5.4	2.9	80.7	73.4	1.7	7.5	88.9	463
	Angus	39	75.8	19.6	1.8	2.8	81.6	74.6	2.5	6.1	85.3	453
	Average	84	75.9	17.6	3.6	2.9	81.2	74.0	2.1	6.8	87.1	458
Charolais	Hereford	44	70.5	23.4	1.5	4.6	86.3	74.6	5.3	8.3	88.1	432
	Angus	23	83.9	12.0	.0	4.1	79.3	76.1	1.1	2.9	88.3	439
	Average	67	77.2	17.7	.8	4.3	82.8	75.4	3.2	5.6	88.2	435
Average	Hereford	229	75.5	15.6	2.5	6.5	86.2	76.6	3.9	7.1	84.5	437
All Sire	Angus	198	77.2	17.1	1.3	4.4	83.5	78.2	2.9	3.7	84.0	434
Breeds	Average	427	76.3	16.4	1.9	5.5	84.8	77.4	3.4	5.4	84.3	436

[a] Calves from these cows were sired by Hereford, Angus, Gelbvieh, Maine Anjou and Chianina bulls (appendix table 3).
[b] No assistance or minor hand assistance.
[c] Of cows alive at calving; cows removed from experiment only for serious injury, being open two successive years or by death.
[d] Early mortality is within 24 hr of birth; late is from 24 hr after birth until weaning.
[e] Adjusted for birth date and to a steer basis. Least-squares adjustment factors for heifers were 5.4 lb. for birth weight and 16 lb. for 200-day weight.

TABLE 5. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DATE, REBREEDING PERFORMANCE AND SIZE OF COWS CALVING AS 3-YEAR-OLDS
CYCLE I, PHASE 2 - COWS BORN IN 1970-71

Breed of Cow		No. Calving as 3-Year-Olds	Avg. Calving Date	Postpartum Interval, Days[a]	Percent Pregnant[b]	Cow Wt. at 3½ Yrs. of Age, lb.	Hip Ht. at 3½ Yrs. of Age, in.[c]
Sire	Dam						
Angus	Hereford	27	April 8	61.3	92.5	937	47.5
Hereford	Angus	35	April 3	62.3	92.5	981	47.5
	Average	62	April 6	61.8	92.5	959	47.5
Jersey	Hereford	49	March 31	65.4	97.9	840	47.6
	Angus	30	March 26	69.9	90.0	826	47.5
	Average	79	March 29	67.7	93.9	833	47.5
South Devon	Hereford	27	April 11	67.5	88.0	1019	49.8
	Angus	32	April 11	56.1	87.5	1002	48.9
	Average	59	April 11	61.8	87.8	1011	49.3
Limousin	Hereford	37	April 11	60.0	94.1	1006	50.0
	Angus	39	April 7	59.7	97.4	998	49.1
	Average	76	April 9	59.3	95.8	1002	49.6
Simmental	Hereford	45	April 12	62.5	93.3	1022	50.2
	Angus	39	April 6	63.2	90.0	1032	49.8
	Average	84	April 9	62.8	91.7	1027	50.0
Charolais	Hereford	44	April 10	61.4	97.6	1095	50.2
	Angus	23	April 10	69.2	95.5	1079	49.4
	Average	67	April 10	65.3	96.5	1087	49.8
Average	Hereford	229	April 8	62.9	93.9	987	49.2
All Sire	Angus	198	April 6	62.8	92.2	986	48.7
Breeds	Average	427	April 7	62.8	93.0	987	49.0

[a] Interval from calving to first estrus.
[b] Breeding period was 64 days by natural service to Brown Swiss bulls. Percent pregnant = no. palpated as pregnant ÷ no. palpated.
[c] Hip height measurements at 3½ years of age available only on 1971-born cows.

TABLE 6. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DIFFICULTY, CALF CROP PERCENTAGE, CALF MORTALITY, BIRTH WEIGHT AND WEANING WEIGHT OF CALVES FROM 4-YEAR-OLD COWS[a]
CYCLE I, PHASE 2 - COWS BORN IN 1970

Breed of Cow		No. Calves Born	Type of Parturition, %				Calf Crop, %[c]		Calf Mortality, %[d]		Calf Wt., lb.[e]	
Sire	Dam		No Diff.[b]	Calf-Puller	C-Section	Abn. Presentation	Born	Weaned	Early	Late	Birth	200-Day
Angus	Hereford	19	95.9	4.5	.0	.0	95.0	94.5	.7	.0	90.9	475
Hereford	Angus	22	90.5	9.8	.0	.0	95.7	92.2	4.1	.0	89.8	452
	Average	41	93.2	7.2	.0	.0	95.4	93.3	2.4	.0	90.4	464
Jersey	Hereford	25	90.8	8.8	.0	.4	100.0	92.8	3.2	4.0	84.2	477
	Angus	12	97.6	1.6	.0	.9	80.0	80.0	.0	.1	76.8	453
	Average	37	94.2	5.2	.0	.7	90.0	86.4	1.6	2.1	80.5	465
South Devon	Hereford	12	94.1	.0	7.3	1.1	85.7	85.7	.0	.1	94.8	454
	Angus	13	77.3	15.5	.2	7.0	86.7	86.2	.7	.0	95.9	484
	Average	25	85.7	7.8	3.8	4.0	86.2	85.9	.4	.0	95.3	469
Limousin	Hereford	26	93.5	6.6	.0	.0	96.3	92.6	3.8	.0	91.8	462
	Angus	26	67.7	19.9	.0	12.4	100.0	97.5	2.4	.1	92.1	453
	Average	52	80.6	13.3	.0	6.2	98.2	95.0	3.1	.0	91.9	457
Simmental	Hereford	20	82.1	13.7	.3	4.0	90.9	90.8	.5	.0	91.9	516
	Angus	21	90.0	9.8	.0	.3	95.5	91.2	4.5	.0	93.7	506
	Average	41	86.0	11.7	.1	2.1	93.2	91.0	2.5	.0	92.8	511
Charolais	Hereford	32	88.6	8.8	.0	2.6	93.9	82.9	8.9	2.9	93.0	479
	Angus	13	94.9	5.5	.2	.0	92.9	92.9	.0	.0	99.4	483
	Average	45	91.7	7.1	.1	1.3	93.4	87.9	4.5	1.5	96.2	481
Average	Hereford	134	90.8	7.1	1.3	1.4	93.6	89.9	2.9	1.2	91.1	477
All Sire	Angus	107	86.3	10.4	.1	3.4	91.8	90.1	2.0	.0	91.3	472
Breeds	Average	241	88.6	8.7	.7	2.4	92.7	90.0	2.5	.6	91.2	475

[a] Calves from these cows were sired by Brown Swiss bulls (appendix table 3).
[b] No assistance or minor hand assistance.
[c] Of cows alive at calving; cows removed from experiment only for serious injury, being open two successive years or by death.
[d] Early mortality is within 24 hr of birth; late is from 24 hr after birth until weaning.
[e] Adjusted for birth date and to a steer basis. Least-squares adjustment factors for heifers were 4.2 lb. for birth weight and 25 lb. for 200-day weight.

TABLE 7. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DATE, REBREEDING PERFORMANCE AND SIZE OF COWS CALVING AS 4-YEAR-OLDS
CYCLE I, PHASE 2 - COWS BORN IN 1970

Breed of Cow		No. Calving as 4-Year-Olds	Avg. Calving Date	Postpartum Interval, Days[a]	Percent Pregnant[b]	Cow Wt. at 4½ Yrs. of Age, lb.	Hip Ht. at 4½ Yrs. of Age, in.
Sire	Dam						
Angus	Hereford	23	April 10	51.2	100.0	950	47.5
Hereford	Angus	22	April 6	55.1	100.0	962	47.2
	Average	45	April 8	53.1	100.0	956	47.4
Jersey	Hereford	32	March 31	52.9	96.0	899	48.4
	Angus	13	March 25	60.6	100.0	844	46.9
	Average	45	March 28	56.8	98.0	872	47.7
South Devon	Hereford	25	April 3	58.8	100.0	1028	49.5
	Angus	12	April 11	60.0	100.0	1022	49.4
	Average	37	April 7	59.4	100.0	1025	49.4
Limousin	Hereford	20	April 10	56.2	100.0	1000	49.7
	Angus	21	March 29	67.5	96.2	1016	49.6
	Average	41	April 4	61.9	98.1	1008	49.6
Simmental	Hereford	12	April 15	55.2	100.0	1070	50.5
	Angus	13	April 2	60.1	100.0	1014	49.8
	Average	25	April 9	57.6	100.0	1042	50.2
Charolais	Hereford	19	April 8	56.6	100.0	1072	50.0
	Angus	18	April 8	54.4	92.3	1120	49.9
	Average	37	April 8	55.5	96.2	1096	49.9
Average	Hereford	131	April 8	55.1	99.3	1003	49.3
All Sire	Angus	99	April 3	60.2	98.1	996	48.8
Breeds	Average	230	April 5	57.4	98.7	1000	49.0

[a] Interval from calving to first estrus.
[b] Breeding period was 64 days by natural service to Brown Swiss bulls. Percent pregnant = no. palpated as pregnant ÷ no. palpated.

TABLE 8. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DIFFICULTY OF CALVES FROM 2-YEAR-OLD COWS
CYCLE I, PHASE 3 - 1972-73-74 CALF CROPS

Breed of Calf		No. Calves Born[b]	Type of Parturition, %			
Sire	Dam[a]		No Calving Difficulty[c]	Calf-Puller	C-Section	Abnormal Presentation
Angus	Hereford-Crosses	62	74.4	23.1	0.0	2.5
Hereford	Angus-Crosses	66	69.0	23.3	3.7	4.0
	Average	128	71.7	23.2	1.8	3.3
Brahman	Hereford-Crosses	74	34.9	42.9	8.0	14.2
	Angus-Crosses	75	33.2	57.9	4.1	4.8
	Average	149	34.1	50.4	6.0	9.5
Devon	Hereford-Crosses	71	71.5	25.0	2.4	1.1
	Angus-Crosses	67	63.1	28.2	3.7	5.0
	Average	138	67.3	26.6	3.1	3.1
Holstein	Hereford-Crosses	80	46.4	41.7	5.1	6.8
	Angus-Crosses	64	55.9	37.2	1.7	5.2
	Average	144	51.2	39.4	3.4	6.0
Average	Hereford-Crosses	287	56.8	33.2	3.9	6.1
All Sire	Angus-Crosses	272	55.3	36.6	3.3	4.8
Breeds	Average	559	56.1	34.9	3.6	5.4

[a] Two-way-cross cows mated as shown in appendix table 3.
[b] Only AI sired calves included.
[c] No assistance or minor hand assistance.

TABLE 9. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
BIRTH DATE, CALF MORTALITY, BIRTH WEIGHT AND PREWEANING GROWTH OF CALVES FROM 2-YEAR-OLD COWS
CYCLE I, PHASE 3 - 1972-73-74 CALF CROPS

Breed of Calf		No. Calves Weaned[b]	Birth Date	Calf Mortality[c]		Calf Wt., lb.[d]			
Sire	Dam[a]			Early	Late	Birth	200-Day	Prewn. ADG, lb.[d]	200-Day Wt. Ratio[e]
Angus	Hereford-Crosses	56	April 8	2.2	10.3	67.8	383	1.57	99.5
Hereford	Angus-Crosses	60	April 4	6.7	2.8	70.2	386	1.57	100.3
	Average	116	April 6	4.5	6.5	69.0	385	1.57	100.0
Brahman	Hereford-Crosses	60	March 24	12.9	7.0	80.9	430	1.74	111.7
	Angus-Crosses	55	March 25	17.6	8.5	77.3	424	1.73	110.1
	Average	115	March 24	15.3	7.8	79.1	427	1.73	110.9
Devon	Hereford-Crosses	67	March 22	1.4	3.3	69.9	388	1.59	100.8
	Angus-Crosses	62	March 17	2.3	5.0	70.3	393	1.61	102.1
	Average	129	March 19	1.8	4.2	70.1	391	1.60	101.6
Holstein	Hereford-Crosses	68	March 14	8.0	8.8	73.8	405	1.65	105.2
	Angus-Crosses	55	March 12	10.3	5.2	74.1	395	1.60	102.6
	Average	123	March 13	9.2	7.0	73.9	400	1.63	103.9
Average	Hereford-Crosses	251	March 25	6.1	7.4	73.1	402	1.64	104.4
All Sire	Angus-Crosses	232	March 22	9.2	5.4	73.0	400	1.63	103.9
Breeds	Average	483	March 23	7.7	6.4	73.0	401	1.63	104.2

[a] Two-way-cross cows mated as shown in appendix table 3.
[b] Birth traits calculated from all calves born from AI matings.
[c] Early mortality is within 24 hr of birth; late is from 24 hr after birth until weaning.
[d] Adjusted for birth date and to a steer basis. Least-squares adjustment factors for heifers were 4.8 lb. for birth weight, 22 lb. for 200-day weight and .08 lb./day for ADG.
[e] Ratio computed relative to 385 lb. average for Hereford and Angus sired calves.

TABLE 10. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DIFFICULTY AND CALF MORTALITY OF CALVES FROM 4-5-6-7-8-9-YEAR-OLD COWS
CYCLE II, PHASE 2 - 1973-74 CALF-CROPS

Breed of Calf		No. Calves Born	Type of Parturition, %				Calf Mortality, %[b]	
Sire	Dam		No calving Difficulty[a]	Calf-Puller	C-Section	Abnormal Presentation	Early	Late
Hereford	Hereford	86	93.3	3.6	.2	3.0	.2	1.7
Angus	Angus	129	96.7	1.0	.0	2.4	3.1	4.4
	Average	215	95.0	2.3	.1	2.7	1.7	3.1
Angus	Hereford	104	90.7	1.9	.2	7.3	3.3	1.0
Hereford	Angus	125	89.7	3.6	.0	6.9	3.1	.2
	Average	229	90.2	2.8	.1	7.1	3.2	.6
Red Poll	Hereford	93	91.0	6.4	.2	2.5	.1	2.2
	Angus	123	98.7	1.4	.0	.1	.3	.9
	Average	216	94.8	3.9	.1	1.3	.2	1.5
Brown Swiss	Hereford	124	87.3	10.1	.2	2.4	.9	.3
	Angus	140	94.9	4.7	.0	.7	2.0	3.4
	Average	264	91.1	7.4	.1	1.5	1.4	1.9
Gelbvieh	Hereford	94	87.5	6.3	.3	5.9	6.2	4.9
	Angus	119	90.1	7.5	.0	2.6	2.9	7.0
	Average	213	88.8	6.9	.2	4.2	4.5	6.0
Maine Anjou	Hereford	99	64.9	22.8	3.7	8.5	9.7	3.7
	Angus	123	79.1	15.6	.4	4.9	7.6	3.9
	Average	222	72.0	19.2	2.1	6.7	8.7	3.8
Chianina	Hereford	116	80.0	12.5	1.2	6.2	5.9	5.1
	Angus	123	87.8	8.1	.2	3.8	2.2	7.8
	Average	239	83.9	10.3	.7	5.0	4.1	6.5
Average All Sire Breeds	Hereford	716	84.9	9.1	1.0	5.1	3.7	2.7
	Angus	882	91.0	6.0	.1	3.1	3.0	4.0
	Average	1598	88.0	7.5	.6	4.1	3.4	3.3

[a] No assistance or minor hand assistance.
[b] Early mortality is within 24 hr of birth; late is from 24 hr after birth until weaning.

TABLE 11. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
BIRTH DATE, BIRTH WEIGHT AND PREWEANING GROWTH[a]
CYCLE II, PHASE 2 - 1973-74 CALF CROPS

Breed of Calf		No. Calves Weaned[b]	Birth Date	Birth Wt., lb.[c]	Prewn. ADG, lb.[c]	Adj. 200-Day Wt., lb.[c]	200-Day Wt. Ratio[d]
Sire	Dam						
Hereford	Hereford	84	April 6	86.0	1.55	395	92.7
Angus	Angus	121	March 29	76.8	1.74	425	99.8
	Average	205	April 2	81.4	1.66	410	96.2
Angus	Hereford	100	April 4	84.2	1.64	413	96.9
Hereford	Angus	122	April 1	84.6	1.78	440	103.3
	Average	222	April 2	84.4	1.71	426	100.0
Red Poll	Hereford	89	April 5	86.8	1.62	412	96.7
	Angus	121	April 2	80.5	1.76	432	101.4
	Average	210	April 4	83.7	1.69	422	99.1
Brown Swiss	Hereford	121	April 9	92.8	1.70	432	101.4
	Angus	133	April 3	89.4	1.85	459	107.7
	Average	254	April 6	91.1	1.77	445	104.5
Gelbvieh	Hereford	84	April 7	93.0	1.71	434	101.9
	Angus	110	April 1	88.0	1.95	477	112.0
	Average	194	April 4	90.5	1.83	456	107.0
Maine Anjou	Hereford	87	April 6	97.2	1.66	428	100.5
	Angus	112	April 1	93.1	1.89	470	110.3
	Average	199	April 3	95.1	1.77	449	105.4
Chianina	Hereford	104	April 12	96.3	1.73	441	103.5
	Angus	113	April 5	91.9	1.93	478	112.2
	Average	217	April 8	94.1	1.83	459	107.7
Average	Hereford	669	April 7	90.9	1.66	422	99.1
All Sire	Angus	832	April 2	86.3	1.84	454	106.6
Breeds	Average	1501	April 4	88.6	1.75	438	102.8

[a] All calves from cows 4 years of age or older.
[b] Birth traits calculated from all calves born.
[c] Adjusted for birth date and to a steer basis. Least-squares adjustment factors for heifers were 6.0 lb. for birth weight, 24 lb. for 200-day weight and .10 lb./day for ADG.
[d] Ratio computed relative to average 426 lb. for Angus-Hereford and Hereford-Angus crossbred controls.

TABLE 12. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
CALVING DIFFICULTY AND CALF MORTALITY OF CALVES FROM 4-5-6-7-8-9-YEAR-OLD COWS
CYCLE II, PHASE 2 - 1973-74 CALF CROPS[a]

Breed of Calf		No. Calves Born	Type of Parturition, %				Calf Mortality, %[c]	
Sire	Dam		No Calving Difficulty[b]	Calf-Puller	C-Section	Abnormal Presentation	Early	Late
Hereford	Hereford	86	93.3	3.6	.2	3.0	.2	1.7
	Angus	125	89.7	3.6	.0	6.9	3.1	.2
	Red Poll	46	81.2	15.5	1.7	1.6	8.5	2.8
	Brown Swiss	28	99.8	.0	.0	.9	5.0	.1
	Average	285	91.0	5.7	.5	3.1	4.2	1.2
Angus	Hereford	104	90.7	1.9	.2	7.3	3.3	1.0
	Angus	129	96.7	1.0	.0	2.4	3.1	4.4
	Red Poll	48	94.2	7.0	.0	.0	2.1	1.3
	Brown Swiss	30	99.3	.0	.1	1.0	1.4	3.5
	Average	311	95.2	2.5	.1	2.7	2.5	2.6
Red Poll	Hereford	93	91.0	6.4	.2	2.5	.1	2.2
	Angus	123	98.7	1.4	.0	.1	.3	.9
	Red Poll	40	92.8	3.6	1.6	2.0	6.6	.0
	Brown Swiss	22	99.5	.0	.0	1.2	.8	9.1
	Average	278	95.5	2.9	.5	1.5	2.0	3.1
Brown Swiss	Hereford	124	87.3	10.1	.2	2.4	.9	.3
	Angus	140	94.9	4.7	.0	.7	2.0	3.4
	Red Poll	45	76.5	21.7	1.6	.2	8.2	1.2
	Brown Swiss	34	93.9	.0	.0	6.4	10.2	9.8
	Average	343	88.2	9.1	.5	2.4	5.3	3.7
Average All Sire Breeds	Hereford	407	90.6	5.5	.2	3.8	1.1	1.3
	Angus	517	95.0	2.7	.0	2.5	2.1	2.2
	Red Poll	179	86.2	11.9	1.2	1.0	6.3	1.3
	Brown Swiss	114	98.1	.0	.0	2.4	4.3	5.6
	Average	1217	92.5	5.0	.4	2.4	3.5	2.6

[a] Calves from Hereford and Angus dams are also included in table 10.
[b] No assistance or minor hand assistance.
[c] Early mortality is within 24 hr of birth; late is from 24 hr after birth until weaning.

TABLE 13. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
BIRTH DATE, BIRTH WEIGHT AND PREWEANING GROWTH[a]
CYCLE II, PHASE 2 - 1973-74 CALF CROPS[b]

Breed of Calf		No. Calves	Birth	Birth	Prewn.	Adj. 200-	200-Day
Sire	Dam	Weaned[c]	Date	Wt., lb.[d]	ADG, lb.[d]	Day Wt., lb.[d]	Wt. Ratio[e]
Hereford	Hereford	84	April 6	86.0	1.55	395	84.2
	Angus	122	April 1	84.6	1.78	440	93.8
	Red Poll	41	April 1	89.1	1.89	465	99.1
	Brown Swiss	27	April 4	100.9	2.24	550	117.3
	Average	274	April 3	90.2	1.87	463	98.7
Angus	Hereford	100	April 4	84.2	1.64	413	88.1
	Angus	121	March 29	76.8	1.74	425	90.6
	Red Poll	47	March 29	86.4	1.99	483	103.0
	Brown Swiss	29	April 1	93.9	2.32	558	119.0
	Average	297	March 31	85.3	1.92	470	100.2
Red Poll	Hereford	89	April 5	86.8	1.62	412	87.8
	Angus	121	April 2	80.5	1.76	432	92.1
	Red Poll	38	April 2	87.6	1.81	448	95.5
	Brown Swiss	20	April 3	95.4	2.25	545	116.2
	Average	268	April 3	87.6	1.86	459	97.9
Brown Swiss	Hereford	121	April 9	92.8	1.70	432	92.1
	Angus	133	April 3	89.4	1.85	459	97.9
	Red Poll	41	April 2	96.5	2.05	505	107.7
	Brown Swiss	28	April 6	100.9	2.18	536	114.3
	Average	324	April 5	94.9	1.95	483	103.0
Average	Hereford	394	April 6	87.5	1.63	413	88.1
All Sire	Angus	497	April 1	82.8	1.78	439	93.6
Breeds	Red Poll	167	April 1	89.9	1.93	475	101.3
	Brown Swiss	104	April 3	97.8	2.25	547	116.6
	Average	1162	April 3	89.5	1.90	469	100.0

[a] All calves from 4-year-old or older cows.
[b] Calves from Hereford and Angus dams are also included in table 11.
[c] Birth traits calculated from all calves born.
[d] Adjusted for birth date and to a steer basis. Least-squares adjustment factors for heifers were 5.2 lb. for birth weight, 20 lb. for 200-day weight and .08 lb./day for ADG.
[e] Ratio computed relative to overall average of 469 lb.

TABLE 14. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
STEER POSTWEANING FEEDLOT RATIONS
CYCLE II, PHASE 2 - 1973 CALF CROP

Period	Ingredients				Ration Analyses, 100% D.M. Basis[a]			
	Corn Silage, %	Alfalfa Haylage, %	Concentrate, %[b]	Supplement, %[c]	C.P., %	D.P., %	TDN, %	Mcal. M.E./lb.
Nov. 20 - Dec. 17	40.0	20.0	37.0	3.0	13.6	8.1	76.4	1.25
Dec. 17 - Jan. 15	30.0	20.0	47.0	3.0	13.4	8.2	78.0	1.28
Jan. 16 - Feb. 11	20.0	20.0	58.5	1.5	12.6	7.6	79.4	1.30
Feb. 12 - Mar. 10	10.0	20.0	68.5	1.5	12.6	7.7	80.4	1.32
Mar. 11 - Slau.	0.0	20.0	76.0	4.0	12.6	8.2	80.3	1.32

[a] Estimated composition based on proximate analysis.
[b] The concentrate contained equal amounts of cracked corn and cracked sorghum.
[c] Crude protein level (100% D.M. basis) in the supplement was 28.8% from Nov. 20 to Jan. 15, 8.2% from Jan. 16 to Mar. 10 and 41.9% from Mar. 11 until slaughter. Urea was included in the supplement except from Jan. 16 to Mar. 10. Source of concentrate changed on March 11.

TABLE 15. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
POSTWEANING AVERAGE DAILY GAINS AND ADJUSTED FINAL WEIGHTS OF STEERS
CYCLE II, PHASE 2 - 1973 CALF CROP

Breed of Steer		No. Steers[a]					Postweaning Average Daily Gain[b]					Adjusted Final Weight[c]					
Sire	Dam	220	248	282	338	Total	220	248	282	338	Avg.[d]	220	248	282	338	Avg.[d]	Ratio[e]
Hereford	Hereford	4	4	5	..	13	2.53	2.33	2.29	....	2.31	969	986	1045	....	1016	99.1
Angus	Angus	8	7	7	..	22	2.37	2.30	2.24	....	2.27	951	974	1053	....	1014	98.9
	Average	12	11	12	..	35	2.45	2.32	2.26	....	2.29	960	980	1049	....	1015	99.0
Angus	Hereford	8	7	8	..	23	2.47	2.48	2.29	....	2.39	961	1010	1059	....	1035	101.0
Hereford	Angus	9	9	9	..	27	2.25	2.34	2.25	....	2.30	913	984	1047	....	1016	99.1
	Average	17	16	17	..	50	2.36	2.41	2.27	....	2.34	937	997	1053	....	1025	100.0
Red Poll	Hereford	9	7	8	..	24	2.25	2.46	2.19	....	2.33	914	1026	1035	....	1031	100.6
	Angus	8	9	9	..	26	2.10	2.02	1.93	....	1.98	898	943	991	....	967	94.3
	Average	17	16	17	..	50	2.18	2.24	2.06	....	2.15	906	985	1013	....	999	97.5
Brown Swiss	Hereford	4	5	4	7	20	2.61	2.48	2.54	2.55	2.51	998	1035	1156	1310	1096	106.9
	Angus	6	5	5	8	24	2.53	2.57	2.32	2.48	2.45	1010	1084	1099	1315	1092	106.5
	Average	10	10	9	15	44	2.57	2.53	2.43	2.52	2.48	1004	1060	1128	1312	1094	106.7
Gelbvieh	Hereford	..	8	6	7	21	....	2.49	2.48	2.49	2.49	....	1052	1120	1287	1086	106.0
	Angus	..	10	10	10	30	....	2.39	2.34	2.32	2.37	....	1052	1130	1241	1091	106.4
	Average	..	18	16	17	51	....	2.44	2.41	2.41	2.43	....	1052	1125	1264	1089	106.2
Maine Anjou	Hereford	..	3	4	7	14	....	2.63	2.59	2.33	2.61	....	1085	1186	1212	1136	110.8
	Angus	..	8	7	10	25	....	2.61	2.51	2.29	2.56	....	1126	1158	1213	1142	111.4
	Average	..	11	11	17	39	....	2.62	2.55	2.31	2.59	....	1105	1172	1213	1139	111.1
Chianina	Hereford	..	6	6	8	20	....	2.56	2.46	2.39	2.51	....	1084	1114	1264	1099	107.2
	Angus	..	7	7	8	22	....	2.51	2.24	2.38	2.38	....	1092	1105	1294	1099	107.2
	Average	..	13	13	16	42	....	2.53	2.35	2.38	2.44	....	1088	1110	1279	1099	107.2
Average	Hereford	25	40	41	29	135	2.47	2.49	2.41	2.44	2.45	960	1040	1102	1268	1071	104.5
All Sire	Angus	31	55	54	36	176	2.31	2.39	2.26	2.37	2.33	943	1036	1083	1266	1060	103.4
Breeds	Average	56	95	95	65	311	2.39	2.44	2.34	2.40	2.39	952	1038	1093	1267	1066	104.0

[a] Number of steers slaughtered after 220, 248, 282 and 338 days postweaning.
[b] ADG = (actual final wt. - actual weaning wt.) ÷ days on feed.
[c] Adj. final wt. = 200-day wt. + (postwn. ADG x days on feed postwn.).
[d] Average calculated only for dates common to all breed groups.
[e] Ratio relative to 1025 lb. average of Hereford-Angus crossbreds.

TABLE 16. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
FEED EFFICIENCY
CYCLE II, PHASE 2 - 1973 CALF CROP

Breed of Steer		No. Steers[a]					Feed Efficiency (TDN and Mcal ME)[b]				
Sire	Dam	220	248	282	338	Total	220	248	282	338	Avg.[c]
Hereford	Hereford	4	4	5	..	13					
Angus	Angus	8	7	7	..	22					
	Average	12	11	12	..	35	5.95 (9.76)	6.11 (10.02)	6.23 (10.22)	....	6.10 (10.00)
Angus	Hereford	8	7	8	..	23					
Hereford	Angus	8	9	9	..	26					
	Average	16	16	17	..	49	6.31 (10.35)	6.44 (10.56)	6.57 (10.77)	....	6.44 (10.56)
Red Poll	Hereford	9	7	8	..	24					
Red Poll	Angus	8	9	9	..	26					
Hereford	Red Poll	3	4	3	..	10					
Angus	Red Poll	4	4	3	..	11					
	Average	24	24	23	..	71	6.72 (11.02)	6.81 (11.17)	6.94 (11.38)	....	6.82 (11.19)
Brown Swiss	Hereford	4	5	4	7	20					
Brown Swiss	Angus	6	5	5	8	24					
Hereford	Brown Swiss	2	2	3	..	7					
Angus	Brown Swiss	3	3	2	..	8					
	Average	15	15	14	15	59	6.31 (10.35)	6.48 (10.63)	6.62 (10.86)	6.71 (11.00)	6.47 (10.61)
Gelbvieh	Hereford	..	8	6	7	21					
	Angus	..	10	10	10	30					
	Average	..	18	16	17	51	6.18 (10.14)	6.44 (10.56)	6.62 (10.86)	6.62 (10.86)	6.41 (10.52)
Maine Anjou	Hereford	..	3	4	7	14					
	Angus	..	8	7	10	25					
	Average	..	11	11	17	39	5.98 (9.81)	6.34 (10.40)	6.54 (10.73)	6.54 (10.73)	6.29 (10.31)
Chianina	Hereford	..	6	6	8	20					
	Angus	..	7	7	8	22					
	Average	..	13	13	16	42	6.44 (10.56)	6.65 (10.91)	6.82 (11.18)	6.88 (11.28)	6.64 (10.89)
Overall Average		67	108	106	65	346	6.27 (10.28)	6.47 (10.61)	6.62 (10.86)	6.69 (10.97)	6.45 (10.58)

[a] Number of steers slaughtered after 220, 248, 282 and 338 days on feed.
[b] Metabolizable Energy (ME) values shown in parentheses. TDN Efficiency = lb. TDN consumed per lb. gain.
[c] Mcal ME = lb. TDN x 1.64. TDN and ME on a 100% dry matter basis.
Average calculated only for dates common to all breed groups.

TABLE 17. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
HOT CARCASS WEIGHT, DRESSING PERCENTAGE AND U.S.D.A. QUALITY GRADE
CYCLE II, PHASE 2 - 1973 CALF CROP

Breed of Steer		Hot Carcass Wt., lb.					Dressing Percent[a]					U.S.D.A. Quality Grade[b]				
Sire	Dam	220	248	282	338	Avg.[c]	220	248	282	338	Avg.[c]	220	248	282	338	Avg.[c]
Hereford	Hereford	567	594	639	...	617	58.1	59.8	60.5	....	60.2	10.8	11.9	10.9	....	11.4
Angus	Angus	565	604	640	...	622	58.8	60.1	60.2	....	60.2	12.3	13.5	12.4	....	13.0
	Average	566	599	640	...	620	58.5	60.0	60.4	....	60.2	11.6	12.7	11.7	....	12.2
Angus	Hereford	576	602	637	...	620	58.7	59.0	59.6	....	59.3	12.0	11.1	12.8	....	12.0
Hereford	Angus	567	595	644	...	620	60.9	59.1	60.3	....	59.7	11.2	10.6	12.2	....	11.4
	Average	571	599	640	...	620	59.8	59.1	60.0	....	59.5	11.6	10.9	12.5	....	11.7
Red Poll	Hereford	537	610	629	...	620	58.5	58.9	59.7	....	59.3	10.4	10.1	11.8	....	11.0
	Angus	541	574	594	...	584	59.2	59.7	59.3	....	59.5	10.5	12.0	12.3	....	12.2
	Average	539	592	612	...	602	58.8	59.3	59.5	....	59.4	10.4	11.0	12.1	....	11.6
Brown Swiss	Hereford	571	621	692	803	657	58.3	59.2	59.5	60.2	59.4	10.1	11.0	11.8	12.0	11.4
	Angus	625	657	682	816	670	60.2	60.2	60.7	61.9	60.5	11.2	12.2	12.7	12.5	12.5
	Average	598	639	687	809	663	59.2	59.7	60.1	61.0	59.9	10.6	11.6	12.3	12.2	12.0
Gelbvieh	Hereford	...	622	671	783	647	....	59.2	59.3	59.8	59.3	....	10.3	10.4	10.8	10.4
	Angus	...	638	699	763	669	....	59.7	61.0	60.1	60.4	....	10.8	11.8	11.9	11.3
	Average	...	630	685	773	658	....	59.4	60.2	59.9	59.8	....	10.6	11.1	11.3	10.9
Maine Anjou	Hereford	...	641	719	744	680	....	59.7	60.7	60.7	60.2	....	11.0	12.3	10.5	11.7
	Angus	...	694	719	765	707	....	61.9	61.5	61.8	61.7	....	11.2	12.2	12.5	11.7
	Average	...	667	719	754	693	....	60.8	61.1	61.2	61.0	....	11.1	12.2	11.5	11.7
Chianina	Hereford	...	673	675	783	674	....	61.3	60.6	61.6	61.0	....	9.1	9.9	10.1	9.5
	Angus	...	680	678	816	679	....	61.8	60.4	62.5	61.1	....	10.8	11.4	11.7	11.1
	Average	...	677	677	799	677	....	61.5	60.5	62.0	61.0	....	10.0	10.7	10.9	10.3
Average	Hereford	562	623	666	778	645	58.4	59.6	60.0	60.6	59.8	10.8	10.6	11.4	10.8	11.0
All Sire	Angus	574	635	665	790	650	59.7	60.3	60.5	61.6	60.4	11.3	11.6	12.2	12.1	11.9
Breeds	Average	568	629	665	784	647	59.1	60.0	60.2	61.1	60.1	11.0	11.1	11.8	11.5	11.5

[a] Dressing percent equals hot carcass weight divided by final weight on feed and water (without shrink).
[b] U.S.D.A. Quality Grade: 10 = average good, 11 = high good, 12 = low choice, 13 = high choice, etc.
[c] Average calculated only for dates common to all breed groups.

TABLE 18. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
MARBLING SCORE, U.S.D.A. YIELD GRADE AND RIBEYE AREA
CYCLE II, PHASE 2 - 1973 CALF CROP

Breed of Steer		Marbling Score[a]					U.S.D.A. Yield Grade					Ribeye Area, sq. in.				
Sire	Dam	220	248	282	338	Avg.[b]	220	248	282	338	Avg.[b]	220	248	282	338	Avg.[b]
Hereford	Hereford	9.3	11.4	9.7	....	10.6	3.2	3.7	3.7	...	3.7	10.1	10.2	10.3	....	10.3
Angus	Angus	12.9	16.1	12.2	....	14.2	3.3	3.8	3.6	...	3.7	10.1	10.1	10.9	....	10.5
	Average	11.1	13.8	10.9	....	12.4	3.3	3.8	3.7	...	3.7	10.1	10.2	10.6	....	10.4
Angus	Hereford	11.8	10.1	13.7	....	11.9	3.2	3.6	4.1	...	3.9	10.8	10.2	10.2	....	10.2
	Angus	9.8	9.5	12.1	....	10.8	3.5	3.4	4.3	...	3.9	9.6	10.1	10.3	....	10.2
	Average	10.8	9.8	12.9	....	11.4	3.4	3.5	4.2	...	3.9	10.2	10.2	10.3	....	10.2
Red Poll	Hereford	8.9	8.2	11.5	....	9.9	3.1	3.6	4.0	...	3.8	10.0	10.3	10.5	....	10.4
	Angus	8.4	11.5	13.7	....	12.6	3.3	3.1	3.6	...	3.4	10.0	10.3	10.2	....	10.3
	Average	8.7	9.9	12.6	....	11.3	3.2	3.3	3.8	...	3.6	10.0	10.3	10.3	....	10.3
Brown Swiss	Hereford	9.1	9.8	11.3	11.8	10.6	2.7	3.0	3.2	3.8	3.1	10.3	10.9	11.7	12.8	11.3
	Angus	9.2	12.0	13.6	12.2	12.8	2.9	3.2	3.3	4.1	3.3	11.3	11.4	12.0	12.6	11.7
	Average	9.1	10.9	12.4	12.0	11.7	2.8	3.1	3.3	4.0	3.2	10.8	11.2	11.9	12.7	11.5
Gelbvieh	Hereford	....	8.2	9.1	8.8	8.7	...	3.3	2.8	2.9	3.1	....	10.7	12.3	13.9	11.5
	Angus	....	9.1	11.8	11.9	10.5	...	2.9	3.8	3.8	3.4	....	12.1	11.5	12.4	11.8
	Average	....	8.7	10.4	10.4	9.6	...	3.1	3.3	3.4	3.2	....	11.4	11.9	13.1	11.7
Maine Anjou	Hereford	....	9.1	12.8	8.9	11.0	...	2.7	3.6	2.6	3.2	....	11.4	11.1	13.0	11.3
	Angus	....	10.6	11.8	14.0	11.2	...	3.1	2.7	4.1	2.9	....	12.2	13.2	11.8	12.7
	Average	....	9.8	12.3	11.5	11.1	...	2.9	3.2	3.3	3.1	....	11.8	12.1	12.4	12.0
Chianina	Hereford	....	7.6	8.2	8.2	7.9	...	2.9	2.8	3.1	2.9	....	11.7	12.0	13.4	11.9
	Angus	....	9.3	11.6	10.9	10.5	...	2.9	2.9	2.8	2.9	....	12.5	12.1	14.2	12.3
	Average	....	8.5	9.9	9.6	9.2	...	2.9	2.9	3.0	2.9	....	12.1	12.0	13.8	12.1
Average	Hereford	9.8	9.2	10.9	9.4	10.1	3.1	3.3	3.5	3.1	3.4	10.3	10.8	11.2	13.3	11.0
All Sire	Angus	10.1	11.2	12.4	12.3	11.8	3.2	3.2	3.5	3.7	3.4	10.3	11.2	11.5	12.7	11.4
Breeds	Average	9.9	10.2	11.6	10.9	10.9	3.2	3.2	3.5	3.4	3.4	10.3	11.0	11.3	13.0	11.2

[a] Marbling Score: 9 = slight+, 10 = small-, ... 21 = slightly abundant+.
[b] Average calculated only for dates common to all breed groups.

TABLE 19. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
FAT THICKNESS AND PERCENT KIDNEY, PELVIC AND HEART FAT
CYCLE II, PHASE 2 - 1973 CALF CROP

Breed of Steer		Fat Thickness, in.					Estimated Percent Kidney, Pelvic and Heart Fat				
Sire	Dam	220	248	282	338	Avg.[a]	220	248	282	338	Avg.[a]
Hereford	Hereford	.53	.65	.63	...	.64	2.9	3.0	2.8	...	2.9
Angus	Angus	.53	.60	.60	...	.60	3.1	3.6	3.6	...	3.6
	Average	.53	.63	.62	...	.62	3.0	3.3	3.2	...	3.3
Angus	Hereford	.54	.55	.75	...	.65	3.3	3.8	3.3	...	3.6
Hereford	Angus	.54	.52	.82	...	.67	3.2	3.3	3.2	...	3.3
	Average	.54	.54	.79	...	.66	3.3	3.6	3.3	...	3.5
Red Poll	Hereford	.48	.54	.65	...	.60	3.1	3.8	4.4	...	4.1
	Angus	.47	.41	.52	...	.47	3.8	3.8	4.3	...	4.1
	Average	.47	.48	.59	...	.54	3.4	3.8	4.3	...	4.1
Brown Swiss	Hereford	.33	.39	.48	.63	.44	2.9	3.4	3.5	4.1	3.5
	Angus	.42	.53	.53	.70	.53	3.3	3.5	4.0	4.4	3.8
	Average	.38	.46	.51	.67	.49	3.1	3.4	3.7	4.2	3.6
Gelbvieh	Hereford	...	.44	.36	.46	.40	...	3.9	4.1	3.9	4.0
	Angus	...	.47	.55	.59	.51	...	3.2	4.8	4.9	4.0
	Average	...	.45	.46	.53	.46	...	3.5	4.5	4.4	4.0
Maine Anjou	Hereford	...	.36	.51	.33	.44	...	3.0	3.5	3.1	3.3
	Angus	...	.48	.41	.65	.45	...	3.5	3.3	4.5	3.4
	Average	...	.42	.46	.49	.44	...	3.2	3.4	3.8	3.3
Chianina	Hereford	...	.38	.37	.44	.38	...	3.5	3.5	4.4	3.5
	Angus	...	.43	.41	.39	.42	...	3.8	3.6	4.2	3.7
	Average	...	.41	.39	.42	.40	...	3.6	3.6	4.3	3.6
Average	Hereford	.47	.47	.54	.47	.51	3.0	3.5	3.6	3.9	3.6
All Sire	Angus	.49	.49	.55	.58	.52	3.3	3.5	3.8	4.5	3.7
Breeds	Average	.48	.48	.54	.52	.51	3.2	3.5	3.7	4.2	3.6

[a] Average calculated only for dates common to all breed groups.

TABLE 20. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
PERCENTAGE BONE, PERCENTAGE FAT TRIM AND PERCENTAGE RETAIL PRODUCT
CYCLE II, PHASE 2 - 1973 CALF CROP

Breed of Steer		Bone, %					Fat Trim, %					Retail Product, %[a]				
Sire	Dam	220	248	282	338	Avg.[b]	220	248	282	338	Avg.[b]	220	248	282	338	Avg.[b]
Hereford	Hereford	12.7	12.1	11.8	....	12.0	18.9	22.7	22.4	....	22.6	68.4	65.1	65.8	....	65.5
Angus	Angus	11.8	11.2	11.2	....	11.2	20.6	23.7	23.5	....	23.6	67.6	65.1	65.3	....	65.2
	Average	12.3	11.7	11.5	....	11.6	19.8	23.2	23.0	....	23.1	68.0	65.1	65.5	....	65.3
Angus	Hereford	11.9	11.5	11.4	....	11.5	20.2	23.5	24.4	....	24.0	67.9	65.0	64.3	....	64.7
Hereford	Angus	12.5	12.0	11.0	....	11.5	20.0	21.9	25.1	....	23.5	67.6	66.1	63.9	....	65.0
	Average	12.2	11.8	11.2	....	11.5	20.1	22.7	24.8	....	23.8	67.7	65.6	64.1	....	64.9
Red Poll	Hereford	12.7	12.0	11.8	....	11.9	19.5	22.1	23.9	....	23.0	67.8	65.9	64.3	....	65.1
	Angus	12.2	12.6	11.8	....	12.2	19.2	20.2	23.9	....	22.1	68.6	67.2	64.2	....	65.7
	Average	12.5	12.3	11.8	....	12.1	19.3	21.1	23.9	....	22.5	68.2	66.6	64.3	....	65.4
Brown Swiss	Hereford	13.7	13.6	12.4	11.9	13.0	15.8	18.0	21.8	23.2	19.9	70.5	68.4	65.7	64.9	67.1
	Angus	13.2	12.6	11.7	11.5	12.2	18.0	20.6	22.2	25.1	21.4	68.8	66.8	66.1	63.4	66.5
	Average	13.5	13.1	12.0	11.7	12.6	16.9	19.3	22.0	24.1	20.7	69.7	67.6	65.9	64.1	66.8
Gelbvieh	Hereford	....	12.5	12.2	11.9	12.4	....	20.3	18.6	20.0	19.5	....	67.2	69.2	68.1	68.2
	Angus	....	11.9	11.8	11.3	11.9	....	19.3	22.3	23.5	20.8	....	68.8	65.8	65.1	67.3
	Average	....	12.2	12.0	11.6	12.1	....	19.8	20.5	21.8	20.2	....	68.0	67.5	66.6	67.8
Maine Anjou	Hereford	....	13.6	12.9	13.0	13.3	....	16.0	20.8	16.4	18.4	....	70.4	66.3	70.6	68.4
	Angus	....	12.3	12.0	11.6	12.2	....	20.1	19.5	24.1	19.8	....	67.5	68.6	64.3	68.1
	Average	....	13.0	12.4	12.3	12.7	....	18.1	20.1	20.3	19.1	....	69.0	67.4	67.4	68.2
Chianina	Hereford	....	14.2	14.1	12.6	14.2	....	16.5	15.6	19.5	16.1	....	69.2	70.3	68.0	69.8
	Angus	....	12.6	12.9	12.4	12.8	....	18.5	18.3	18.0	18.4	....	69.0	68.8	69.6	68.9
	Average	....	13.4	13.5	12.5	13.5	....	17.5	17.0	18.7	17.3	....	69.1	69.5	68.8	69.3
Average	Hereford	12.8	12.8	12.4	12.4	12.6	18.6	19.9	21.1	19.8	20.5	68.6	67.3	66.5	67.9	66.9
All Sire	Angus	12.4	12.2	11.8	11.7	12.0	19.4	20.6	22.1	22.7	21.4	68.1	67.2	66.1	65.6	66.7
Breeds	Average	12.6	12.5	12.1	12.0	12.3	19.0	20.2	21.6	21.2	20.9	68.4	67.3	66.3	66.7	66.8

[a] Retail Product, % = Actual yield of boneless, closely trimmed beef from the carcass.
[b] Average calculated only for dates common to all breed groups.

TABLE 21. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
ACTUAL PERCENT CUTABILITY, WARNER-BRATZLER SHEAR AND TASTE PANEL ACCEPTABILITY
CYCLE II, PHASE 2 - 1973 CALF CROP

Breed of Steer		Actual Cutability, %[a]					Warner-Bratzler Shear, lb.[b]					Taste Panel Acceptability[c]				
Sire	Dam	220	248	282	338	Avg.[d]	220	248	282	338	Avg.[d]	220	248	282	338	Avg.[d]
Hereford	Hereford	55.5	52.5	52.3	....	52.4	7.6	7.0	6.9	...	7.0	6.8	8.0	7.6	...	7.8
Angus	Angus	53.6	51.4	51.6	....	51.5	7.0	6.9	6.1	...	6.5	6.9	7.9	7.9	...	7.9
	Average	54.5	51.9	51.9	....	51.9	7.3	7.0	6.5	...	6.8	6.9	7.9	7.7	...	7.8
Angus	Hereford	54.3	52.0	51.0	....	51.5	6.5	7.0	6.5	...	6.8	7.5	7.9	7.6	...	7.8
Hereford	Angus	54.4	53.1	50.4	....	51.8	6.6	7.9	7.1	...	7.5	7.4	7.2	7.8	...	7.5
	Average	54.3	52.5	50.7	....	51.6	6.5	7.5	6.8	...	7.2	7.5	7.5	7.7	...	7.6
Red Poll	Hereford	54.5	53.3	51.3	....	52.3	6.9	7.4	6.8	...	7.1	7.8	7.6	7.6	...	7.6
	Angus	54.8	54.2	51.2	....	52.7	7.3	7.7	7.2	...	7.5	6.7	7.3	7.6	...	7.5
	Average	54.6	53.7	51.3	....	52.5	7.1	7.6	7.0	...	7.3	7.3	7.4	7.6	...	7.5
Brown Swiss	Hereford	57.0	55.6	52.7	52.3	54.2	7.8	8.4	7.4	6.1	7.9	7.3	7.3	7.6	7.7	7.5
	Angus	55.8	53.9	52.9	50.6	53.4	6.5	6.8	7.6	6.9	7.2	7.4	7.8	7.6	7.8	7.7
	Average	56.4	54.8	52.8	51.5	53.8	7.1	7.6	7.5	6.5	7.6	7.4	7.6	7.6	7.7	7.6
Gelbvieh	Hereford	....	54.1	55.5	54.9	54.8	...	8.0	6.6	6.3	7.3	...	7.2	7.2	7.7	7.2
	Angus	....	54.7	52.6	52.1	53.7	...	7.3	7.4	6.2	7.4	...	7.4	7.6	7.5	7.5
	Average	....	54.4	54.1	53.5	54.3	...	7.7	7.0	6.3	7.4	...	7.3	7.4	7.6	7.4
Maine Anjou	Hereford	....	57.0	53.5	56.9	55.3	...	6.7	6.5	6.8	6.6	...	7.4	7.6	7.7	7.5
	Angus	....	54.3	55.2	51.2	54.8	...	6.8	6.9	6.9	6.9	...	7.5	7.5	7.7	7.5
	Average	....	55.7	54.3	54.1	55.0	...	6.8	6.7	6.9	6.8	...	7.5	7.5	7.7	7.5
Chianina	Hereford	....	56.8	57.1	55.3	57.0	...	8.3	7.5	6.1	7.9	...	7.3	7.2	7.5	7.3
	Angus	....	55.8	55.7	56.4	55.8	...	7.3	6.6	6.5	7.0	...	7.7	7.5	7.7	7.6
	Average	....	56.3	56.4	55.9	56.4	...	7.8	7.1	6.3	7.5	...	7.5	7.3	7.6	7.4
Average	Hereford	55.3	54.5	53.3	54.9	53.9	7.2	7.6	6.9	6.3	7.2	7.3	7.5	7.5	7.6	7.5
All Sire	Angus	54.7	53.9	52.8	52.6	53.4	6.8	7.2	7.0	6.6	7.1	7.1	7.5	7.6	7.7	7.6
Breeds	Average	55.0	54.2	53.1	53.7	53.7	7.0	7.4	6.9	6.5	7.2	7.2	7.5	7.6	7.7	7.5

[a] Actual Cutability, % = Actual yield of boneless, closely trimmed beef from the round, loin, rib and chuck.
[b] A measure of the pounds of force required to shear one-half inch cores of steaks cooked at 350°F to 150°F internal temperature and cooled for 30 minutes at room temperature. Warner-Bratzler shear was obtained from all 311 steers.
[c] Taste panel scores are based on a 9-point hedonic scale, with higher scores indicating greater acceptability.
[d] Taste panel traits were measured on steaks from 4 steers per sire-dam breed group per slaughter date. Averages calculated only for dates common to all breed groups.

TABLE 22. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
TASTE PANEL EVALUATION OF COOKED STEAKS[a]
CYCLE II, PHASE 2 - 1973 CALF CROP

Breed of Steer		Taste Panel Tenderness					Taste Panel Flavor					Taste Panel Juiciness				
Sire	Dam	220	248	282	338	Avg.[b]	220	248	282	338	Avg.[b]	220	248	282	338	Avg.[b]
Hereford	Hereford	6.4	7.9	7.6	...	7.8	7.5	8.0	7.6	...	7.8	7.5	7.9	7.6	...	7.8
Angus	Angus	6.9	8.1	7.9	...	8.0	7.5	7.8	7.7	...	7.8	7.3	7.7	7.8	...	7.8
	Average	6.6	8.0	7.7	...	7.9	7.5	7.9	7.6	...	7.8	7.4	7.8	7.7	...	7.8
Angus	Hereford	7.3	7.9	7.7	...	7.8	7.7	7.7	7.6	...	7.7	7.7	7.8	7.8	...	7.8
Hereford	Angus	7.3	7.3	7.9	...	7.6	7.5	7.1	7.6	...	7.4	7.1	7.5	7.8	...	7.7
	Average	7.3	7.6	7.8	...	7.7	7.6	7.4	7.6	...	7.5	7.4	7.6	7.8	...	7.7
Red Poll	Hereford	7.8	7.5	7.5	...	7.5	7.8	7.6	7.8	...	7.7	7.6	7.4	7.6	...	7.5
	Angus	6.7	7.5	7.6	...	7.6	7.3	7.5	7.7	...	7.6	7.0	7.4	7.4	...	7.4
	Average	7.2	7.5	7.6	...	7.6	7.5	7.6	7.7	...	7.7	7.3	7.4	7.5	...	7.5
Brown Swiss	Hereford	7.2	7.1	7.4	8.0	7.3	7.4	7.5	7.7	7.4	7.6	7.6	7.7	7.8	7.5	7.8
	Angus	7.6	7.8	7.8	8.0	7.8	7.5	7.9	7.6	7.7	7.8	7.5	7.9	7.5	7.9	7.7
	Average	7.4	7.5	7.6	8.0	7.6	7.5	7.7	7.7	7.5	7.7	7.5	7.8	7.7	7.7	7.8
Gelbvieh	Hereford	...	7.3	7.4	7.6	7.4	...	7.5	7.6	7.7	7.6	...	7.4	7.0	7.6	7.2
	Angus	...	7.0	7.5	7.7	7.3	...	7.8	7.6	7.4	7.7	...	7.3	7.7	7.4	7.5
	Average	...	7.1	7.4	7.6	7.3	...	7.6	7.6	7.6	7.6	...	7.4	7.3	7.5	7.4
Maine Anjou	Hereford	...	7.6	7.4	8.0	7.5	...	7.4	7.6	7.6	7.5	...	7.5	7.8	7.5	7.7
	Angus	...	7.8	7.5	7.9	7.7	...	7.6	7.6	7.4	7.6	...	7.6	7.6	7.5	7.6
	Average	...	7.7	7.4	8.0	7.6	...	7.5	7.6	7.5	7.6	...	7.6	7.7	7.5	7.7
Chianina	Hereford	...	7.3	6.9	7.5	7.1	...	7.2	7.5	7.4	7.4	...	7.6	7.4	7.4	7.5
	Angus	...	7.9	7.4	7.9	7.7	...	7.3	7.5	7.7	7.4	...	7.6	7.7	7.7	7.7
	Average	...	7.6	7.1	7.7	7.4	...	7.2	7.5	7.6	7.4	...	7.6	7.5	7.5	7.6
Average	Hereford	7.2	7.5	7.4	7.8	7.5	7.6	7.5	7.6	7.5	7.6	7.6	7.6	7.6	7.5	7.6
All Sire	Angus	7.1	7.6	7.7	7.9	7.7	7.5	7.6	7.6	7.6	7.6	7.2	7.6	7.7	7.6	7.6
Breeds	Average	7.1	7.6	7.5	7.8	7.6	7.5	7.5	7.6	7.5	7.6	7.4	7.6	7.6	7.6	7.6

[a] Taste panel scores are based on a 9-point hedonic scale, with higher scores indicating greater acceptability. Taste panel traits were measured on steaks from 4 steers per sire-dam breed group per slaughter date.

[b] Average calculated only for dates common to all breed groups.

TABLE 23. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
POSTWEANING AVERAGE DAILY GAINS AND ADJUSTED FINAL WEIGHTS
CYCLE II, PHASE 2 - 1973 CALF CROP

Breed of Steer[a]		No. Steers[b]				Postweaning Average Daily Gain[c]				Adjusted Final Weight[d]				
Sire	Dam	220	248	282	Total	220	248	282	Avg.	220	248	282	Avg.	Ratio[e]
Hereford	Hereford	4	4	5	13	2.53	2.33	2.29	2.38	969	986	1045	1000	95.5
	Angus	9	9	9	27	2.25	2.34	2.25	2.28	913	984	1047	981	93.7
	Red Poll	3	4	3	10	2.49	2.40	2.33	2.41	1000	1030	1080	1037	99.0
	Brown Swiss	2	2	3	7	2.36	2.29	2.49	2.38	1068	1093	1292	1151	109.9
	Average	18	19	20	57	2.41	2.34	2.34	2.36	988	1023	1116	1042	99.5
Angus	Hereford	8	7	8	23	2.47	2.48	2.29	2.41	961	1010	1059	1010	96.5
	Angus	8	7	7	22	2.37	2.30	2.24	2.30	951	974	1053	993	94.8
	Red Poll	4	4	3	11	2.30	2.21	2.01	2.17	970	975	1061	1002	95.7
	Brown Swiss	3	3	2	8	2.73	2.64	2.55	2.64	1115	1198	1196	1170	111.7
	Average	23	21	20	64	2.47	2.41	2.27	2.38	999	1039	1092	1043	99.6
Red Poll	Hereford	9	7	8	24	2.25	2.46	2.19	2.30	914	1026	1035	992	94.7
	Angus	8	9	9	26	2.10	2.02	1.93	2.02	898	943	991	944	90.2
	Red Poll	3	3	3	9	2.13	2.32	2.02	2.16	863	1010	1027	967	92.4
	Brown Swiss	2	1	2	5	2.06	2.14	2.23	2.14	995	1059	1162	1072	102.4
	Average	22	20	22	64	2.14	2.24	2.09	2.16	918	1010	1054	994	94.9
Brown Swiss	Hereford	4	5	4	13	2.61	2.48	2.54	2.54	998	1035	1156	1063	101.5
	Angus	6	5	5	16	2.53	2.57	2.32	2.47	1010	1084	1099	1064	101.6
	Red Poll	5	5	5	15	2.72	2.71	2.54	2.66	1086	1158	1230	1158	110.6
	Brown Swiss	1	1	2	4	2.49	2.75	2.32	2.52	1037	1210	1179	1142	109.1
	Average	16	16	16	48	2.59	2.63	2.43	2.55	1033	1122	1166	1107	105.7
Average	Hereford	25	23	25	73	2.47	2.44	2.33	2.41	961	1014	1074	1016	97.0
All Sire	Angus	31	30	30	91	2.31	2.31	2.19	2.27	943	996	1048	996	95.1
Breeds	Red Poll	15	16	14	45	2.41	2.41	2.23	2.35	980	1043	1100	1041	99.4
	Brown Swiss	8	7	9	24	2.41	2.45	2.39	2.42	1054	1140	1207	1134	108.3
	Average	79	76	78	233	2.40	2.41	2.28	2.36	985	1048	1107	1047	100.0

[a] Steers from Hereford and Angus dams also included in table 15.
[b] Number of steers slaughtered after 220, 248 and 282 days postweaning.
[c] ADG = (actual final wt. - actual weaning wt.) ÷ days on feed.
[d] Adj. final wt. = 200-day wt. + (postwn. ADG x days on feed postwn.).
[e] Ratio computed relative to the overall average of 1047 lb.

TABLE 24. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
HOT CARCASS WEIGHT, DRESSING PERCENTAGE, U.S.D.A. QUALITY GRADE AND MARBLING SCORE
CYCLE II, PHASE 2 - 1973 CALF CROP

Breed of Steer[a]		Hot Carcass Wt., lb.				Dressing Percent[b]				U.S.D.A. Quality Grade[c]				Marbling Score[d]			
Sire	Dam	220	248	282	Avg.	220	248	282	Avg.	220	248	282	Avg.	220	248	282	Avg.
Hereford	Hereford	567	594	639	600	58.1	59.8	60.5	59.5	10.8	11.9	10.9	11.2	9.3	11.4	9.7	10.1
	Angus	567	595	644	602	60.9	59.1	60.3	60.1	11.2	10.6	12.2	11.3	9.8	9.5	12.1	10.5
	Red Poll	614	607	633	618	59.0	58.5	58.8	58.8	11.6	10.7	10.3	10.9	11.9	9.1	8.9	10.0
	Brown Swiss	614	706	788	703	58.9	60.9	60.7	60.2	8.9	11.4	11.4	10.6	5.7	10.7	10.4	8.9
	Average	591	626	676	631	59.2	59.6	60.1	59.6	10.6	11.2	11.2	11.0	9.2	10.2	10.3	9.9
Angus	Hereford	576	602	637	605	58.7	59.0	59.6	59.1	12.0	11.1	12.8	12.0	11.8	10.1	13.7	11.9
	Angus	565	604	640	603	58.8	60.1	60.2	59.7	12.3	13.5	12.4	12.7	12.9	16.1	12.2	13.7
	Red Poll	605	599	639	614	59.7	60.2	57.9	59.3	11.1	11.1	9.5	10.6	10.0	10.2	7.4	9.2
	Brown Swiss	658	744	766	723	58.3	59.9	60.0	59.4	11.7	11.9	13.9	12.5	10.8	12.4	16.2	13.1
	Average	601	637	671	636	58.9	59.8	59.4	59.4	11.8	11.9	12.2	12.0	11.3	12.2	12.4	12.0
Red Poll	Hereford	537	610	629	592	58.5	58.9	59.7	59.0	10.4	10.1	11.8	10.8	8.9	8.2	11.5	9.5
	Angus	541	574	594	570	59.2	59.7	59.3	59.4	10.5	12.0	12.3	11.6	8.4	11.5	13.7	11.2
	Red Poll	509	599	621	576	58.1	58.3	59.3	58.6	10.9	11.2	10.3	10.8	9.7	11.7	8.6	10.0
	Brown Swiss	615	619	729	654	59.1	60.8	60.4	60.1	10.0	8.9	11.0	10.0	9.5	6.7	9.5	8.6
	Average	551	601	643	598	58.7	59.4	59.7	59.3	10.5	10.6	11.4	10.8	9.1	9.5	10.8	9.8
Brown Swiss	Hereford	571	621	692	628	58.3	59.2	59.5	59.0	10.1	11.0	11.8	11.0	9.1	9.8	11.3	10.1
	Angus	625	657	682	655	60.2	60.2	60.7	60.4	11.2	12.2	12.7	12.0	9.2	12.0	13.6	11.6
	Red Poll	634	705	739	693	57.3	60.0	59.5	58.9	10.5	10.5	11.1	10.7	9.1	8.8	11.6	9.8
	Brown Swiss	609	718	695	674	58.4	58.3	57.4	58.0	8.9	13.9	11.0	11.3	4.7	16.7	11.0	10.8
	Average	610	675	702	662	58.5	59.4	59.3	59.1	10.2	11.9	11.7	11.3	8.0	11.8	11.9	10.6
Average	Hereford	563	607	649	606	58.4	59.2	59.8	59.1	10.8	11.0	11.8	11.3	9.8	9.9	11.6	10.4
All Sire	Angus	575	608	640	608	59.8	59.8	60.1	59.9	11.3	12.1	12.4	11.9	10.1	12.3	12.9	11.8
Breeds	Red Poll	590	628	658	625	58.5	59.3	58.9	58.9	11.0	10.9	10.3	10.7	10.2	10.0	9.1	9.8
	Brown Swiss	624	697	745	688	58.7	60.0	59.6	59.4	9.9	11.5	11.8	11.0	7.7	11.6	11.8	10.4
	Average	588	635	673	632	58.8	59.6	59.6	59.3	10.8	11.4	11.6	11.3	9.4	10.9	11.4	10.6

[a] Steers from Hereford and Angus dams also included in tables 17 and 18.
[b] Dressing percent equals hot carcass weight divided by final weight on feed and water (without shrink).
[c] U.S.D.A. Quality Grade: 10 = average good, 11 = high good, 12 = low choice, 13 = average choice, etc.
[d] Marbling Score: 9 = slight+, 10 = small-, ... 21 = slightly abundant+.

TABLE 25. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
U.S.D.A. YIELD GRADE, RIBEYE AREA, FAT THICKNESS AND PERCENTAGE KIDNEY, PELVIC AND HEART FAT
CYCLE II, PHASE 2 - 1973 CALF CROP

Breed of Steer[a]		U.S.D.A. Yield Grade				Ribeye Area, sq. in.				Fat Thickness, in.				Est. Percent Kidney, Pelvic and Heart Fat			
Sire	Dam	220	248	282	Avg.	220	248	282	Avg.	220	248	282	Avg.	220	248	282	Avg.
Hereford	Hereford	3.2	3.7	3.7	3.5	10.1	10.2	10.3	10.2	.53	.65	.63	.60	2.9	3.0	2.8	2.9
	Angus	3.5	3.4	4.3	3.7	9.6	10.1	10.3	10.0	.54	.52	.82	.63	3.2	3.3	3.2	3.2
	Red Poll	3.6	3.8	3.6	3.7	10.3	9.7	9.9	10.0	.56	.56	.52	.55	3.6	3.6	3.1	3.4
	Brown Swiss	2.3	3.4	4.0	3.2	11.2	11.3	11.8	11.4	.24	.47	.58	.43	2.7	3.2	4.2	3.4
	Average	3.2	3.6	3.9	3.5	10.3	10.3	10.6	10.4	.47	.55	.64	.55	3.1	3.3	3.3	3.2
Angus	Hereford	3.2	3.6	4.1	3.6	10.8	10.2	10.2	10.4	.54	.55	.75	.61	3.3	3.8	3.3	3.5
	Angus	3.3	3.8	3.6	3.6	10.1	10.1	10.9	10.4	.53	.60	.60	.58	3.1	3.6	3.6	3.4
	Red Poll	3.5	4.0	3.5	3.7	10.4	9.7	11.3	10.5	.53	.58	.52	.54	3.8	4.3	4.8	4.3
	Brown Swiss	4.0	3.2	3.4	3.5	10.1	12.6	13.1	11.9	.59	.47	.54	.53	4.2	3.8	3.9	4.0
	Average	3.5	3.7	3.6	3.6	10.4	10.7	11.4	10.8	.55	.55	.60	.57	3.6	3.9	3.9	3.8
Red Poll	Hereford	3.1	3.6	4.0	3.6	10.0	10.3	10.5	10.3	.48	.54	.65	.56	3.1	3.8	4.4	3.8
	Angus	3.3	3.1	3.6	3.3	10.0	10.3	10.2	10.2	.47	.41	.52	.47	3.8	3.8	4.3	4.0
	Red Poll	3.1	3.1	3.3	3.2	9.6	10.9	10.6	10.4	.34	.37	.37	.36	4.6	4.6	4.6	4.6
	Brown Swiss	3.5	3.3	3.6	3.5	10.4	10.6	11.4	10.8	.38	.37	.48	.41	5.3	4.9	3.8	4.7
	Average	3.3	3.3	3.6	3.4	10.0	10.5	10.7	10.4	.42	.42	.51	.45	4.2	4.3	4.3	4.3
Brown Swiss	Hereford	2.7	3.0	3.2	3.0	10.3	10.9	11.7	11.0	.33	.39	.48	.40	2.9	3.4	3.5	3.3
	Angus	2.9	3.2	3.3	3.1	11.3	11.4	12.0	11.6	.42	.53	.53	.49	3.3	3.5	4.0	3.6
	Red Poll	3.0	3.3	3.0	3.1	10.6	11.8	12.7	11.7	.35	.46	.41	.41	3.6	3.9	4.0	3.8
	Brown Swiss	1.7	3.1	1.7	2.2	11.9	11.5	13.8	12.4	.07	.32	.18	.19	2.9	3.9	2.8	3.2
	Average	2.6	3.2	2.8	2.9	11.0	11.4	12.6	11.7	.29	.43	.40	.37	3.2	3.7	3.6	3.5
Average All Sire	Hereford	3.0	3.5	3.8	3.4	10.3	10.4	10.7	10.5	.47	.53	.63	.54	3.1	3.5	3.5	3.4
	Angus	3.3	3.4	3.7	3.4	10.3	10.5	10.9	10.6	.49	.52	.62	.54	3.3	3.6	3.8	3.5
	Red Poll	3.3	3.5	3.4	3.4	10.2	10.5	11.2	10.6	.44	.49	.46	.46	3.9	4.1	4.1	4.1
	Brown Swiss	2.9	3.3	3.1	3.1	10.9	11.5	12.5	11.6	.32	.41	.44	.39	3.8	4.0	3.7	3.8
	Average	3.1	3.4	3.5	3.3	10.4	10.7	11.3	10.8	.43	.49	.54	.48	3.5	3.8	3.8	3.7

[a] Steers from Hereford and Angus dams also included in tables 18 and 19.

TABLE 26. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
POSTWEANING GROWTH, PUBERTY AND CONCEPTION OF HEIFERS
CYCLE II, PHASE 2 - 1973 CALF CROP

Breed of Heifer								Adjusted[e]		
Sire	Dam	No. Heifers	200-Day Postwn. ADG, lb.	Adj. 400-Day Wt., lb.[a]	Adj. 550-Day Wt., lb.[b]	550-Day Ht., in.[c]	Reaching Puberty, %[d]	Puberty Age, days	Puberty Wt., lb.	Percent Pregnant[f]
Hereford	Hereford	20	1.05	589	717	46.4	95.0	404	590	94.6
Angus	Angus	29	1.13	632	721	46.1	96.7	379	600	84.5
	Average	49	1.09	611	719	46.3	95.9	392	595	89.6
Angus	Hereford	21	1.25	635	750	47.1	90.6	415	659	94.1
Hereford	Angus	21	1.22	671	759	46.7	100.0	375	623	79.6
	Average	42	1.24	653	755	46.9	95.3	395	641	86.9
Red Poll	Hereford	14	1.11	611	734	47.2	92.9	383	594	84.8
	Angus	20	1.05	605	704	46.8	90.1	369	573	79.1
	Average	34	1.08	608	719	47.0	91.5	376	584	82.0
Brown Swiss	Hereford	27	1.14	639	791	48.9	96.4	376	611	95.1
	Angus	24	1.23	685	796	48.8	95.9	347	614	94.4
	Average	51	1.19	662	793	48.9	96.2	362	613	94.7
Gelbvieh	Hereford	21	1.24	673	823	48.6	90.5	389	666	85.2
	Angus	22	1.16	672	786	48.5	100.0	340	589	80.4
	Average	43	1.20	672	805	48.5	95.3	365	628	82.8
Maine Anjou	Hereford	21	1.39	681	829	49.4	100.0	402	672	94.1
	Angus	19	1.38	715	820	48.5	94.9	363	660	93.2
	Average	40	1.38	698	824	49.0	97.5	383	666	93.7
Chianina	Hereford	17	1.13	658	821	51.6	58.9	455	745	64.3
	Angus	18	1.18	707	841	51.4	94.6	385	690	92.8
	Average	35	1.15	683	831	51.5	76.7	420	718	78.5
Average	Hereford	141	1.19	641	781	48.5	89.2	403	648	87.4
All Sire	Angus	153	1.19	670	775	48.1	96.0	365	621	86.3
Breeds	Average	294	1.19	655	778	48.3	92.6	384	635	86.9

[a] Adjusted 400-day wt. = 200-day wt. + (200-day postweaning ADG x 200 days).
[b] Adjusted 550-day wt. = 200-day wt. + (350-day postweaning ADG x 350 days).
[c] Height at hips.
[d] Estrus was determined from weaning to an average of approximately 16 months of age (end of AI plus cleanup).
[e] Adjusted to comparable values if puberty had been detected in 100% of the heifers in all breed groups.
[f] The breeding period was 42 days by AI and 22 days by natural service.

TABLE 27. U.S. MEAT ANIMAL RESEARCH CENTER GERM PLASM EVALUATION PROGRAM
POSTWEANING GROWTH, PUBERTY AND CONCEPTION OF HEIFERS
CYCLE II, PHASE 2 - 1973 CALF CROP

Breed of Heifer[a]								Adjusted[f]		
Sire	Dam	No. Heifers	200-Day Postwn. ADG, lb.	Adj. 400-Day Wt., lb.[b]	Adj. 550-Day Wt., lb.[c]	550-Day Ht., in.[d]	Reaching Puberty, %[e]	Puberty Age, days	Puberty Wt., lb.	Percent Pregnant[g]
Hereford	Hereford	20	1.05	589	717	46.4	95.0	404	590	94.6
	Angus	21	1.22	671	759	46.7	100.0	375	623	79.6
	Red Poll	13	1.15	653	760	47.8	100.0	382	620	66.9
	Brown Swiss	8	1.16	747	897	50.3	89.1	346	670	73.9
	Average	62	1.15	665	783	47.8	96.0	377	626	78.8
Angus	Hereford	21	1.25	635	750	47.1	90.6	415	659	94.1
	Angus	29	1.13	632	721	46.1	96.7	379	600	84.5
	Red Poll	13	1.16	664	776	48.0	100.0	376	616	90.7
	Brown Swiss	10	1.18	756	869	50.2	100.0	321	660	89.1
	Average	73	1.18	672	779	47.9	96.8	373	634	89.6
Red Poll	Hereford	14	1.11	611	734	47.2	92.9	383	594	84.8
	Angus	20	1.05	605	704	46.8	90.1	369	573	79.1
	Red Poll	14	1.12	648	740	49.0	100.0	358	582	69.5
	Brown Swiss	6	1.06	718	823	50.7	100.0	322	627	81.0
	Average	54	1.09	646	750	48.4	95.8	358	594	78.6
Brown Swiss	Hereford	27	1.14	639	791	48.9	96.4	376	611	95.1
	Angus	24	1.23	685	796	48.8	95.9	347	614	94.4
	Red Poll	7	1.24	667	793	49.8	100.0	354	600	83.4
	Brown Swiss	14	1.03	737	885	52.4	100.0	318	665	99.3
	Average	72	1.16	682	816	50.0	98.1	349	623	93.1
Average All Sire Breeds	Hereford	82	1.14	619	748	47.4	93.7	395	614	92.2
	Angus	94	1.16	648	745	47.1	95.7	368	603	84.4
	Red Poll	47	1.17	658	767	48.7	100.0	368	605	77.6
	Brown Swiss	38	1.11	740	869	50.9	97.3	327	656	85.8
	Average	261	1.15	666	782	48.5	96.7	364	620	85.0

[a] Heifers from Hereford and Angus dams also included in table 26.
[b] Adjusted 400-day wt. = 200-day wt. + (200-day postweaning ADG x 200 days).
[c] Adjusted 550-day wt. = 200-day wt. + (350-day postweaning ADG x 350 days).
[d] Height at hips.
[e] Estrus was determined from weaning to an average of approximately 16 months of age (end of AI plus cleanup).
[f] Adjusted to comparable values if puberty had been detected in 100% of the heifers in all breed groups.
[g] The breeding period was 42 days by AI and 22 days by natural service.

APPENDIX

TABLE 1. MATING PLANS TO PRODUCE CYCLE I, PHASE 2 CALVES

1969, 1970, 1971 Breeding Seasons

Dam Breeds[a]	Sire Breeds						
	Here-ford	Angus	Jersey	South Devon	Limou-sin	Sim-mental	Charo-lais
Hereford	X	X	X	X	X	X	X
Angus	X	X	X	X	X	X	X

[a] The cows were 1, 2, 3 and 4-year-olds in 1969; 1, 2, 3, 4 and 5-year-olds in 1970; and 2, 3, 4, 5 and 6-year-olds in 1971.

TABLE 2. MATING PLANS TO PRODUCE CYCLE II, PHASE 2 CALVES

1972 and 1973 Breeding Seasons

Dam Breeds[a]	Sire Breeds						
	Here-ford[b]	Angus[b]	Red Poll	Brown Swiss	Gelb-vieh	Maine Anjou	Chia-nina
Hereford[c]	X	X	X	X	X	X	X
Angus[c]	X	X	X	X	X	X	X
Red Poll	X	X	X	X			
Brown Swiss	X	X	X	X			

[a] The cows were 3, 4, 5, 6 and 7-year-olds in 1972; and 3, 4, 5, 6, 7 and 8-year-olds in 1973.

[b] Sample of same Hereford and Angus sires used in Cycle I, 1969, 1970 and 1971 breeding seasons.

[c] Cows used for GPE Cycle I, 1969, 1970 and 1971 breeding seasons.

APPENDIX

TABLE 3. MATING PLANS TO PRODUCE CYCLE I, PHASE 3 CALVES

	Sire Breeds										
	First Calf Crop[b]					Second Calf Crop[c]					3rd and 4th Calf Crops[d]
Breed Group[a]	Hereford[e]	Angus[e]	Brahman	Devon	Holstein	Hereford[e]	Angus[e]	Gelbvieh	Maine Anjou	Chianina	Brown Swiss
H x H		X					X				X
A x A	X					X					X
A x H			X	X	X			X	X	X	X
H x A			X	X	X			X	X	X	X
J x H		X	X	X	X		X	X	X	X	X
J x A	X		X	X	X	X		X	X	X	X
SD x H		X	X	X	X		X	X	X	X	X
SD x A	X		X	X	X	X		X	X	X	X
L x H		X	X	X	X		X	X	X	X	X
L x A	X		X	X	X	X		X	X	X	X
S x H		X	X	X	X		X	X	X	X	X
S x A	X		X	X	X	X		X	X	X	X
C x H		X	X	X	X		X	X	X	X	X
C x A	X		X	X	X	X		X	X	X	X

[a] Females of each breed group distributed equally among cells marked "X" for each calf crop.
[b] Each group of heifers bred as yearlings to produce one calf crop as 2-year-olds by these breeds.
[c] Each group of cows bred as 2-year-olds to produce one calf crop as 3-year-olds by these breeds.
[d] Each group of cows bred to produce at least two calf crops by this breed.
[e] Sample of same sires used in Cycle I, 1969-70-71 breeding seasons.